Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

FEBRUARY, 1940

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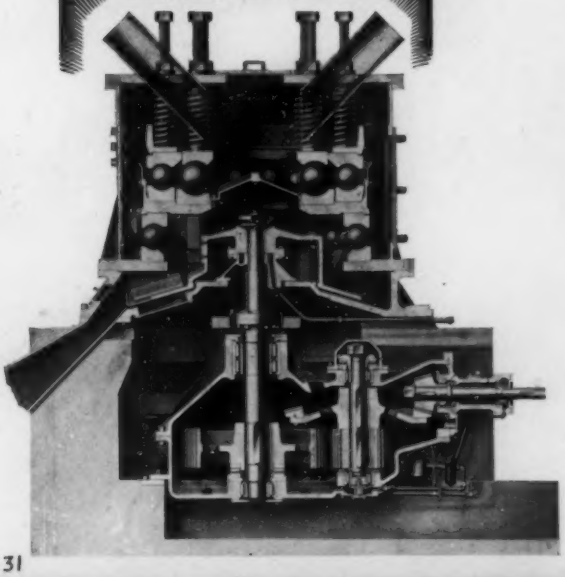
PERIODICAL DIVISION

HOW TO SAVE Money and Space

with the

B & W Closed-Circuit System

DRYING WITHIN THE SYSTEM



By drying within the system you can reduce fuel costs and utilize space formerly occupied by rock driers. You can also eliminate the conveying and elevating equipment used with the driers.

In the B&W Closed-Circuit System, drying of raw material containing a moderate amount of moisture can be done within the system—under automatic control. And the cost of drying is less than with separate driers.

In addition, B&W Pulverizers will accept 1½-inch feed.

The Babcock & Wilcox Company
85 LIBERTY ST. NEW YORK, N. Y.

C-31

WILL YOUR CRUSHERS *Do This?*

HANDLE LARGER ROCK

REDUCE TO DESIRED SIZE IN ONE OPERATION

BETTER CONTROL OVER SIZE OF PRODUCT

MAKE CUBULAR STONE NO SLIVERS

25% TO 75% LESS INVESTMENT CHEAPER CRUSHING

ONLY ONE CRUSHER NEEDED FOR THE JOB

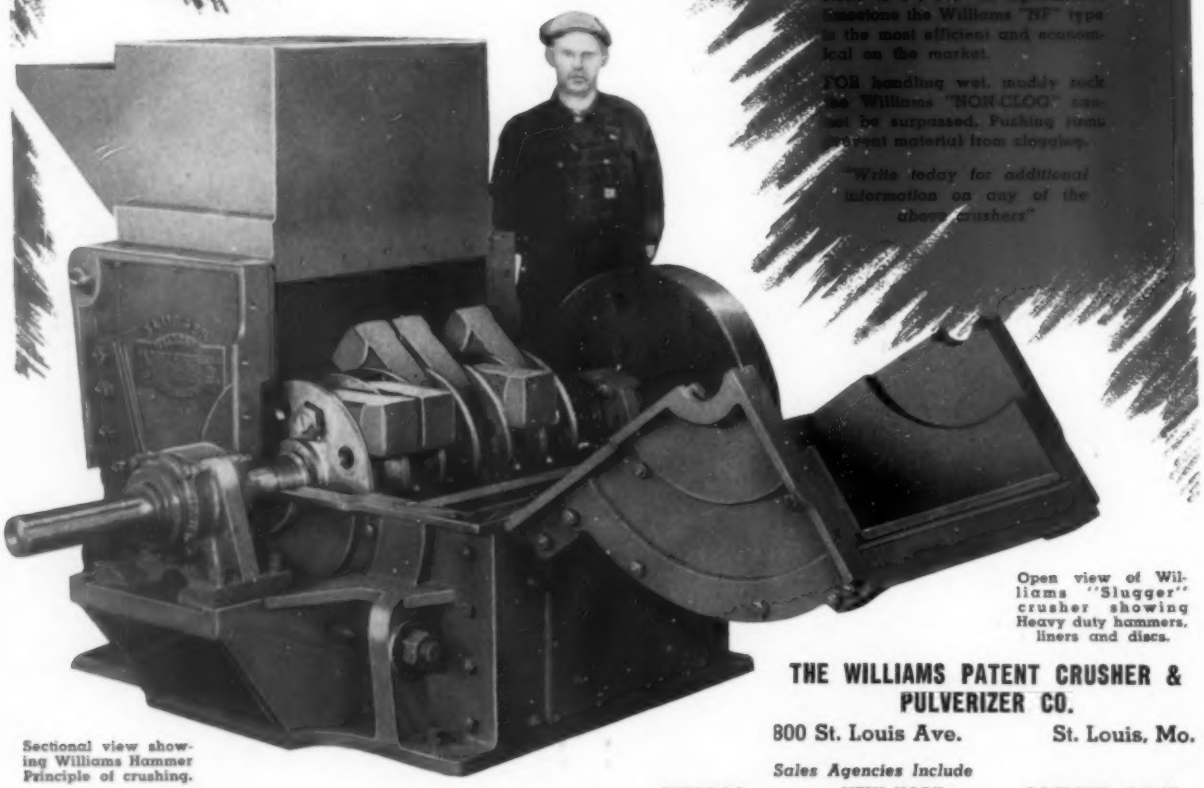
THE "SLUGGER" crushes ONE MAN size rock to 1¼"—¾" or agricultural limestone in One Operation. By reducing large stone to these sizes in one operation the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment. Built in Seven Sizes—6 to 150 tons hourly capacity.

THE "JUMBO" crushes ¾ yd. to 1¼ yd. Power Shovel Loaded Rock to 1¼" in ONE OPERATION. By doing all the work in one operation with one crusher there is a big reduction in the costs of foundations, drives and building, as well as power requirements. Six Sizes—50 to 300 tons hourly capacity.

FOR a recrusher for reducing 5" stone to 1", 1½" or agricultural limestone the Williams "NF" type is the most efficient and economical on the market.

FOR handling wet, muddy rock the Williams "NON-CLOG" cannot be surpassed. Pushing rock or wet material from clogging.

"Write today for additional information on any of the above crushers"



Open view of Williams "Slugger" crusher showing Heavy duty hammers, liners and discs.

Sectional view showing Williams Hammer Principle of crushing.

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO.

800 St. Louis Ave. St. Louis, Mo.

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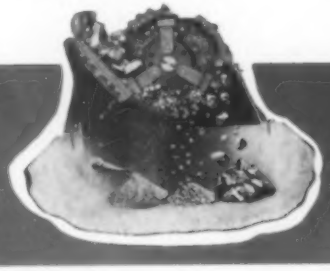
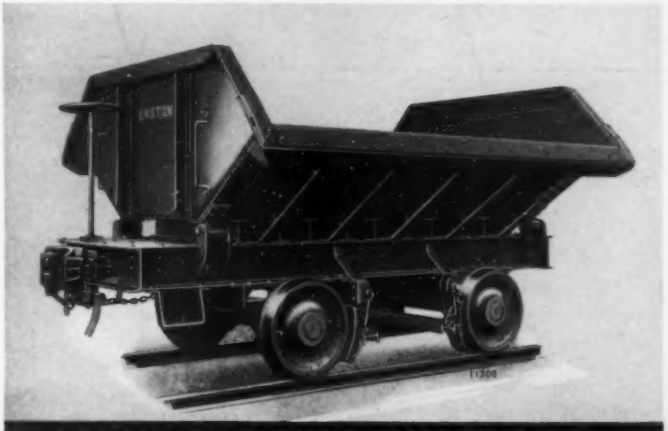


OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

WILLIAMS

PATENT CRUSHERS GRINDERS SHREDDERS

When you OVERHAUL your HAULAGE SYSTEM aim for



EASTON PHOENIX QUARRY CAR

Bigger Payloads

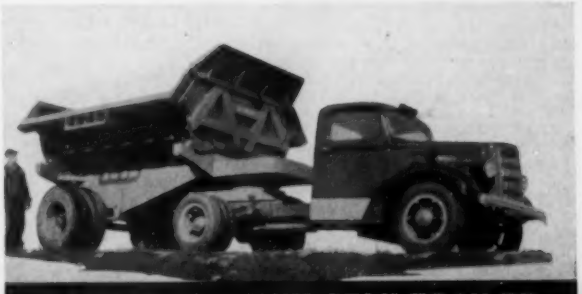
You're losing profits through smaller payloads when your present equipment can't compete with the more efficient service of modern haulage units. Why not aim for Bigger Payloads with Easton?

PHOENIX A patented two-way side-dump container. Hundreds of Phoenix cars are in service in quarries throughout the world. The patented Phoenix design, developed through twenty-five years of painstaking research has recently proved sensationally popular in application to semi-trailer haulage. Investigate Phoenix cars, truck bodies or trailers first.

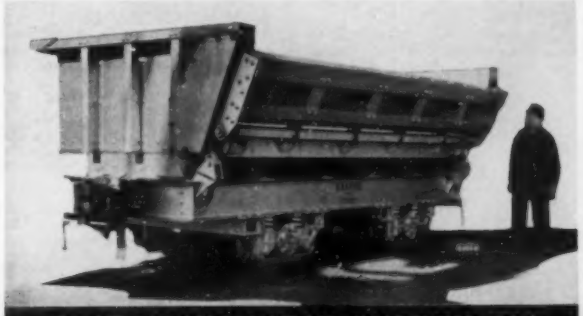
WON WAY Another name made famous by years of reliable quarry service. The patented Won Way, a one-way, side or end dump container, is available in many variations for rail, truck body and trailer haulage.

• • •

Hundreds of other types of rock handling containers have been pioneered and developed by Easton engineers. No matter what capacity you require, or what make or type of locomotive, truck or tractor you employ, the Easton Engineering Service aims to help you select the right containers for *more profitable* tonnage in every load. Consult Easton now for Bigger Payloads.



EASTON PHOENIX SEMI-TRAILER



EASTON WON WAY QUARRY CAR

EASTON WON WAY TRUCK BODY

EASTON CAR & CONSTRUCTION COMPANY, EASTON, PA.

ALL TYPES OF CARS, TRUCK BODIES, AND TRAILERS FOR ROCK HANDLING

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FEB 12 1940

NEXT MONTH'S ISSUE

Featured in the March issue will be an article about an interesting investigation of cement plant grinding installations by three engineers of one of the largest cement companies in the United States; an article describing one of the most complete floating aggregates plants in the country; a study of the most efficient screening practices; and a description of a new, specially designed plant to make stone sand. There will also be a complete report of the National Concrete Masonry Association convention in Washington, D. C.

Grinding Practices

This article reviews the important factors affecting the operation of cement plant grinding circuits, and points out the methods which have been used successfully to improve their performance. Although the study mainly concerns clinker grinding, it is equally applicable to dry grinding of raw materials. The article covers such interesting and practical subjects as grindability of materials, clinker conditioning, preliminary crushing and grinding, mill feeders, grinding media, mill discharge screens, and air separators.

Simplified Practice Recommendation

Difficulties in meeting specifications based on the Simplified Practice Recommendation for Coarse Aggregates, U. S. Bureau of Standards R163-39 and the screening practices which will be necessary to comply with this standard are outlined in a paper by Irving Warner, vice-president of the Warner Co. Some interesting charts show the results of screen tests.

Stone Sand

To meet the rigid requirements for stone sand specifications in Pennsylvania, a special plant with the necessary equipment was built by a large producer. The article gives a step-by-step description of the processing involved in making stone sand, and is illustrated with a flow-sheet of operations and photographs of the latest equipment for this purpose.

Floating Plant

One of the largest floating aggregates plants in the country has been equipped to produce 100 percent crushed gravel, using impact crusher equipment. Unusually large scrubbers have been installed to more thoroughly clean the gravel when in parts of the river containing clay seams. Equipment also includes a new vibrating scalping screen, five new vibrating sizing screens, four belt conveyors, and chutes and hoppers necessary for classification and blending. Two Diesel-electric generating sets provide power for the individual motor drives on the machinery.

Concrete Products

The entire program of the National Concrete Masonry Association has been arranged to bring out a wide variety of practical information and discussion on production and merchandising problems. This information will all be condensed in a complete report of this important convention appearing in the next issue.

ROCK PRODUCTS

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

With which has been consolidated the journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)

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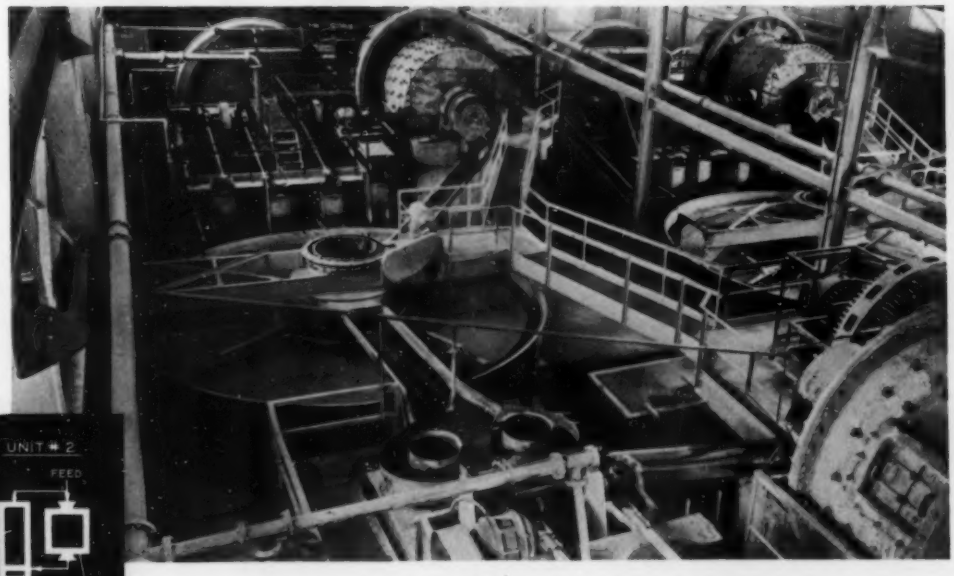
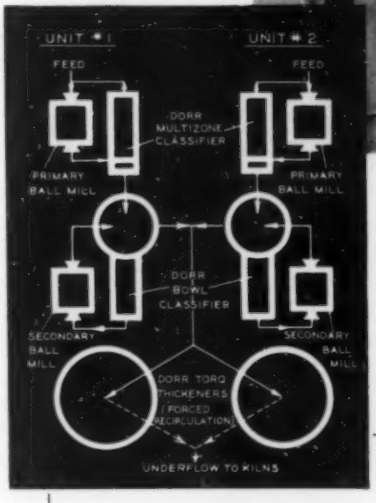
DORR C. C. G. CLOSED CIRCUIT GRINDING

DORRCO

Raw grinding department of Universal Atlas: primary ball mills and Classifiers in foreground, secondaries in background.





for Wet Process Cement

The raw grinding department of the Universal Atlas Cement Company at Leeds, Alabama, employs closed-circuit wet grinding, a practice also used at seven other wet process plants. It grinds the raw material equivalent of a barrel of finished cement at a power consumption considerably less than the average elsewhere.

Final Dorr Classifier overflow, 90 percent minus 200 mesh, is thickened to slurry consistency in two Dorr Thickeners, installed outdoors, and burned in two rotary kilns. Plant capacity is 4000 barrels per day.

A complete description of this plant with flow sheets, photos and operating data is available in reprint form. A copy will gladly be sent on request.

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- Less Power for Raw Grinding.
- Less Consumption Balls and Mill Liners.
- More capacity per mill.
- No coarse, stray oversize in slurry.
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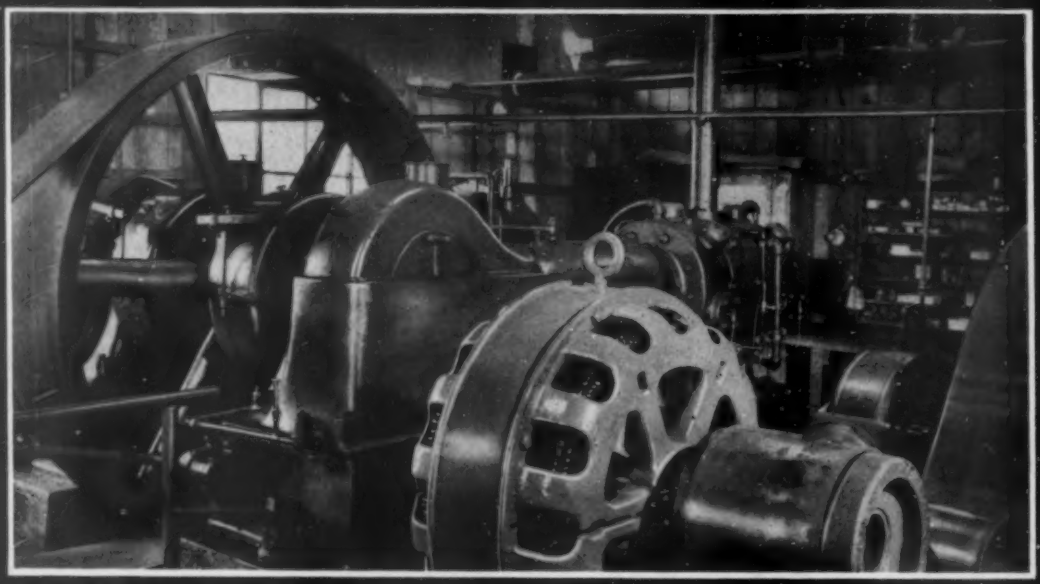

TWO-STAGE AIR COMPRESSORS with free-acting valves since being lubricated with Texaco Alcaid Oil • Other Texaco Oils in use here are Texaco Marfak, Texaco Crater Compound and Texaco Hypoid Lubricants, and, as the report further says, "with 100% satisfaction."

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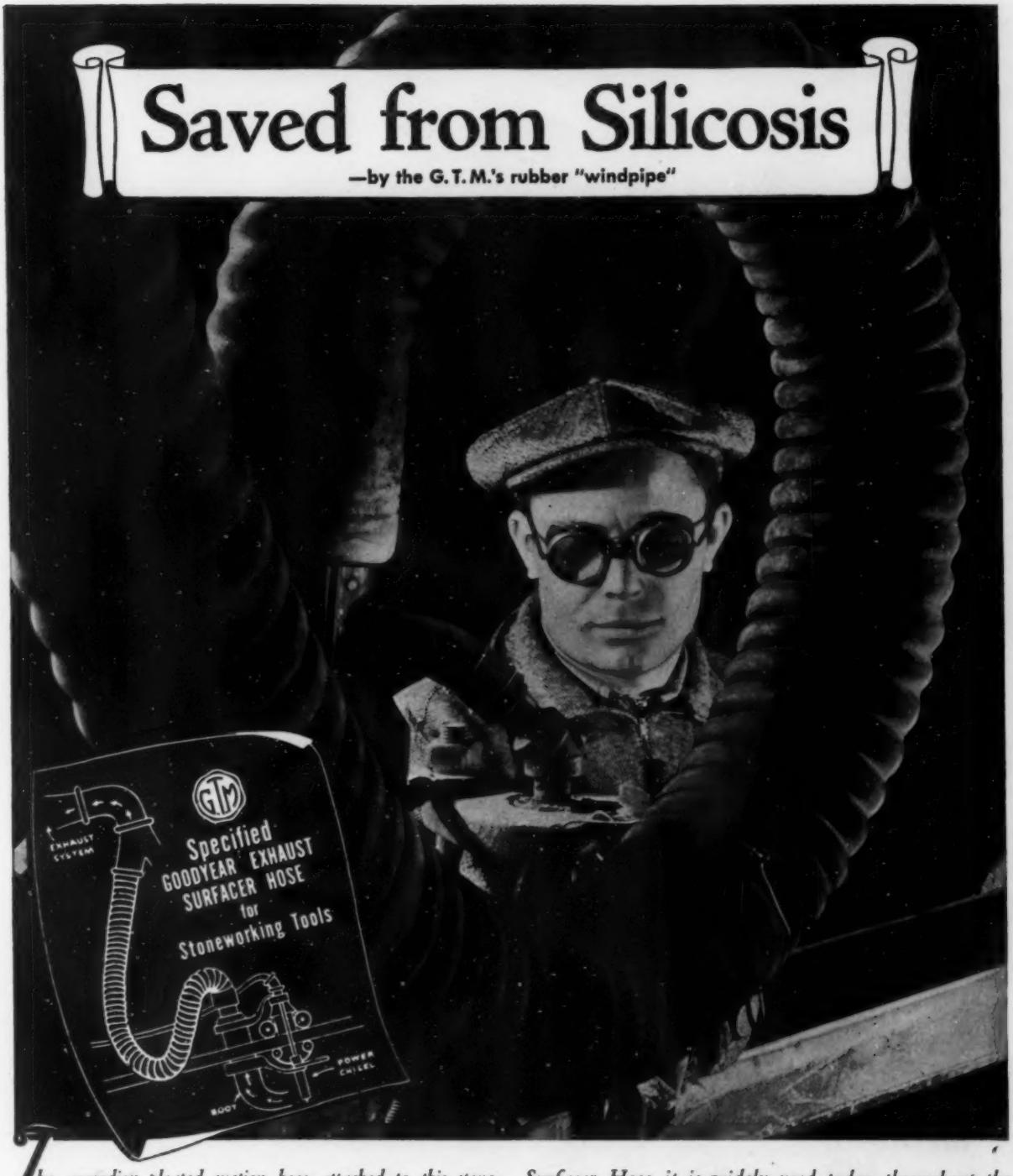
The Texas Company

135 East 42nd Street, New York, N. Y.

Saved from Silicosis

—by the G. T. M.'s rubber "windpipe"



The accordion-pleated suction hose attached to this stonecutter's chisel is his safeguard against silicosis—the choking death that comes from inhaling abrasive dust. It acts as an artificial windpipe, swallowing the deadly dust before it endangers his lungs. Flexible, abrasion-resisting, non-kinking, it is specially designed for stonecutting service by the G. T. M. —Goodyear Technical Man. Known as Goodyear Exhaust Surfacer Hose, it is widely used today throughout the granite industry — because it so long outlasts other types of hose equipment used in combating the silicosis peril! Perhaps you could save with rubber correctly designed and applied by the G. T. M. To consult him, write Goodyear, Akron, Ohio, or Los Angeles, California — or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

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Only Buell Cyclones have a Dust Pocket

"DUST COLLECTION" and "FLY ASH CONTROL"

are two interesting booklets we shall be glad to mail upon request . . .

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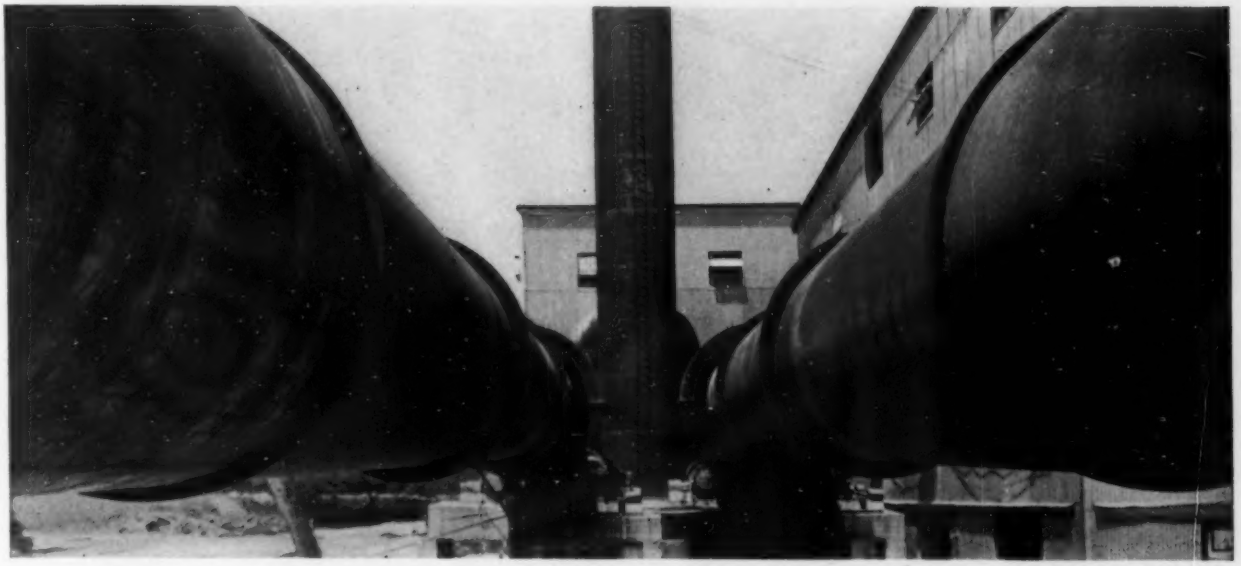
for highest efficiency,

TRAYLOR
ROTARY KILNS
COOLERS AND DRYERS



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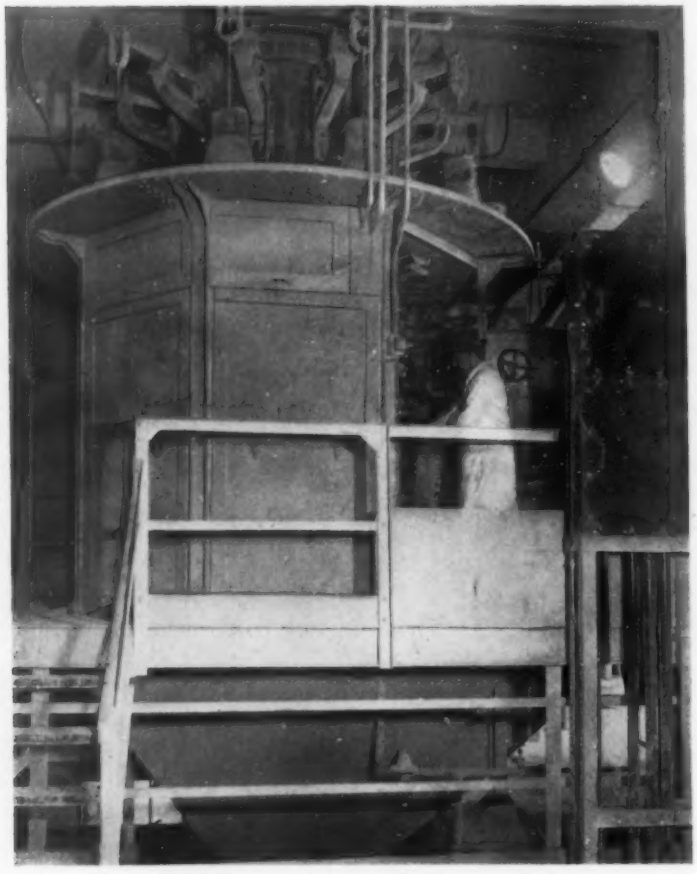
ROTARY FLUXO PACKER



For rapid, automatic packing of cement, lime or similar material into paper or cloth valve bags.

The Rotary Fluxo Packer differs from all other types of valve bag packers. Twelve filling spouts on a rotating hopper pass before the attendant who merely applies the bags—filling, weighing and discharge are automatic. While capacities up to 2000 bags per hour, with accuracy of weighing, are easily obtained, the time allowed for filling each bag with the Fluxo Packer is considerably longer than with other types.

The capacity of the Fluxo Packer is governed entirely by the machine and not upon the skill of the attendant. Accuracy of weighing is assured as the filled bags are discharged before reaching the attendant.

The Fluxo Packer is also built with three or six spouts for smaller capacities. Additional spouts may be added as needed.

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Pontiac, Ill.

Like hundreds of Telsmith plants all over the world, these new rock crushing and gravel washing plants have operated smoothly, efficiently and profitably right from the start. A Telsmith plant means the latest in equipment—crushers to bin gates—Telsmith-designed-and-built for extra staying power, greater flexibility and capacity, lower operating and upkeep costs. And Telsmith *Balanced* Engineering Service and centralized responsibility fits that plant to your own particular needs.

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ROCK PRODUCTS

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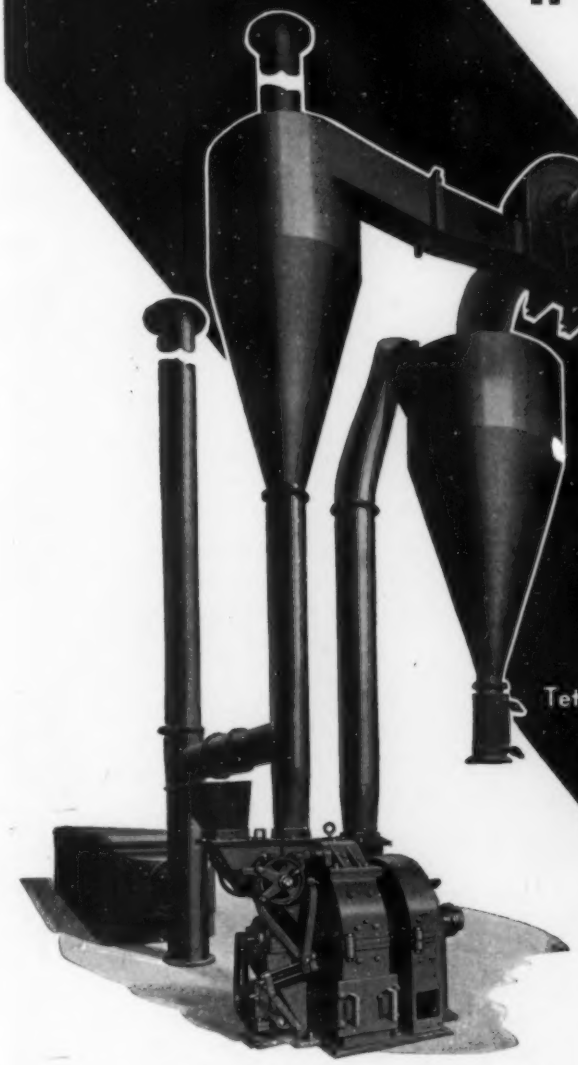
If Your Grinding Problem is "different" . . . the IMP MILL is Your answer



Typical Products handled by Raymond Imp Mills

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Low Gravity Red Lead and Litharge
Pulverizing and Firing Pitch
Drying and Grinding Clay
Asphaltic Limestone
Phosphate Materials
Potassium Chlorate
Grinding Mica
Burnt Lime
Chemicals
Resins
Coal

There is a place in every industry where the Imp Mill can be used to reduce the production cost of powdered materials: By simplifying complicated operations . . . shortening time of process . . . or combining the drying and grinding in a single unit of equipment.

This utility mill may be equipped with air separation . . . with a whizzer separator . . . or operated in closed circuit with a Raymond Mechanical Air Separator for obtaining any degree of classification from granular products up to micron material. It may be used with Raymond flash drying for removing moisture and delivering the product in dry, powdered form.

Ask for the new Imp Mill Bulletin No. 41.

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Greater Tonnage
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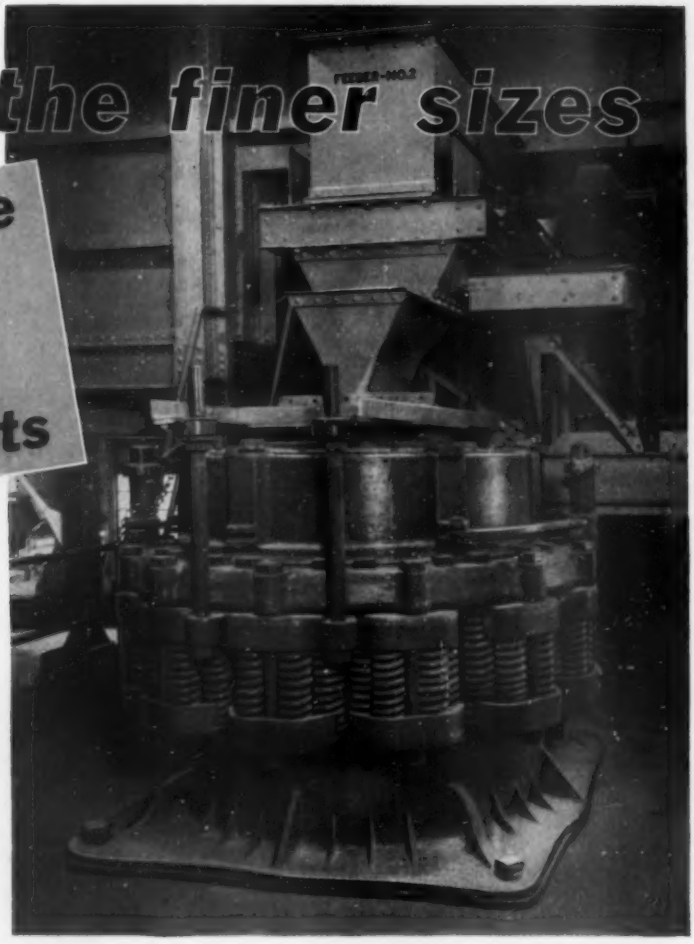
Lower Costs
★
Increased Profits



Four foot Short Head Cone used for making a minus ¼ inch limestone product.

Making minus $\frac{3}{16}$ to $\frac{1}{2}$ inch material in quantity

is best accomplished with the Symons Short Head Cone Crusher as evidenced by the many recent installations among the larger producers of crushed stone, gravel and slag. Its great capacity provides increased output of finer sizes for which there is a constantly growing demand. Its low crushing cost means greater profits. Compare the Cone with any other reduction crusher and note its unusual construction to meet the heavy duty service encountered in fine crushing. Such features as steel construction for all major parts, bronze bearings throughout, pressure lubrication, spring protection against tramp iron damage, all contribute to better performance, lower maintenance and longer life.

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A 1 cubic yard MARION SHOVEL working in the quarries of Elmhurst-Chicago Stone Co.

When Elmhurst-Chicago Stone Company added the Leslie Gravel and Stone Company, Leslie, Illinois, to its active property holdings, it immediately started modernization proceedings. One of the first steps was to install a MARION Type 342 - 1 cu. yd. shovel. Its record speaks for itself. Put a MARION in rock or any hard going and it will repay you with big yardage and low operating cost. Make your next shovel a MARION . . . from ¾ cu. yd. up in size and capacity.

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AS RELIABLE AS THE HYDRAULIC brakes on your car, the Type "R" Crusher's hydraulic step support makes adjustment of the discharge openings simple ... gives you constant control of pressure in the crushing chamber.

322 TYPE "R" CRUSHER TEST REPORT*

Average % Passing Square Openings						
Opening size	1.05"	.742"	.525"	.371"	.185"	.065"
% Passed	100	93.8	65.1	45.9	25.7	13.7

Date of test—March 6-14, 1939
Material—Hard, clean, friable California gravel with high % granite
Feed—Minus 2-½" plus 1"
Average Power Input—19 hp
Capacity—37.5 tons per hour

* Customer's name supplied on request

HERE'S WHAT ONE TYPE "R" Crusher turned out—hard, clean, friable, California gravel at the amazing rate of 37.5 tons per hour! Compare this with your own operating records.

FEED-TO-DISCHARGE VIEW OF A 322 TYPE "R" CRUSHER in closed circuit operation. Shipped completely assembled, Type "R" Crushers installed are compact ... as this one handling limestone in a Florida crushing plant.

A-C

CLEARED IN 1/10 THE TIME

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TAKEN TO CLEAR ORDINARY CRUSHER!

Short Power Interruption Ties Up One Crusher 2½ Hours . . . But Allis-Chalmers Type "R" Crusher is Back on the Job in Just 15 Minutes! Think What This Meant to the Plant Operator . . . What It Can Mean to You . . . in Production Hours Saved . . . in Reduced Operating Costs in Your Plant!

The new Type "R" Crusher at an Eastern crushing plant was doing its part of the job . . . turning out uniform crushed stone at a steady rate . . . running smoothly. Yet, production was moving at only half-capacity . . .

For on the same chute another type crusher was standing idle. Three men were picking out stone from the crushing chamber by hand—a dirty, disagreeable job. Men and machine were not producing!

A short power interruption had just knocked out both crushers . . . caused an unexpected shutdown. The chute was full of feed . . . crushing chambers were loaded. One crusher was jammed up for more than two hours.

Contrast that with the 15 minutes two men took to put that Allis-Chalmers Type "R" Crusher back to work. For in just that time they removed oil from the hydraulic jack, lowered the head, turned the sheave by hand . . . and drained the stone from the crushing chamber.

Two-thirds the man-power . . . one-tenth the time! Think what that meant to the men and the management in that plant! Think what that meant in hours saved . . . in extra dollars earned!

Get Money-Saving Performance!

That's remarkable crushing performance. But it's the same kind of crushing performance that you can get!

For the new Allis-Chalmers 322 Type "R" Crusher gives you continuous, high capacity under crusher-buried feed . . . from correct coordination of speed, crusher chamber design and head movement. Less time-out for tramp iron . . . the automatic relief device passes ordinary tramp iron quickly! And the one-piece, self-tightening concave ring gives uniform, fine setting . . . assures you a uniform product at lower cost!

But there's more that you'll want to know about this new Type "R" Crusher! Bulletin B-6006 has a complete story that really gives you ideas about extra savings in your plant. Send for your copy today! *(And here's a tip—that Allis-Chalmers Type "R" Gyratory Crusher costs less than any comparable machine on the market today.)* A-1172

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ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

"Imagine—ME talking about valve seat inserts!"

It is last summer, and here we are at the store picnic—about 100 of us girls. When all of a sudden, right after the peanut race, somebody yells—"Here comes the eats!" And sure enough, here they come—a whole truck-load of 'em, that pulls right up back of where Betty and Pearl and me are sitting on a bench.

Well, Betty is right in the midst of telling Pearl and me about what happened the other night at the casino, when the fellow that is driving this truck with the eats in it gets out and says kind of with a whistle—

"Boy, what a honey!"

Well, you could have cut the silence with an ice pick.

"Imagine that fresh guy," I says. "Let's just ignore him."

So Betty and Pearl they do just that, wandering away very hoity-toity.

But me, I didn't think it would do any harm to see what the guy looks like, anyway. So, with a stern frown on my face, I turn around. Just in time to hear him say—

"The sweetest job I ever saw in my life!"

So, instead of frowning, I *glare*, expecting to shrivel this masher once and for all.

And, I tell you, I got the shock of my life!

He wasn't looking my way at all! He was standing with his elbows on the front end of this truck of his, mooning like a love-sick calf! Can you feature that!

"Well, how about unloading some sandwiches?" I asks.

"Hello," he says, like he's in a fog. He wasn't so bad-looking.

"Ain't she a dream?" he says.

"Who?" I asks, innocent.

"That Ford," he goes on, looking at me like I was about as important as a can of hominy.

"Sweet runnin', quiet, comfortable, and the easiest job on gas and oil I ever drove. Come here once and just give this V-8 engine the double-O."

And before I knew it he had me by the hand and we were lookin' under the hood of that precious truck of his.

"Look at that engine," he says. "Tungsten steel inserts in every valve port, intake and exhaust."

"Wonderful," I says. And me not knowing a valve seat insert from a crepe suzette.

"Built for low-cost running, that's what I like. I've had trucks before, but, Sister, this Ford takes the cake."

"And I'll take a sandwich," I put in for a hint. But he didn't hear.

"Not only economical, but she's got power along with it. Flattens out hills like a bird. And she's as fast as Joe Louis' left hook. And besides, ain't she a *handsome* baby?"

This time I was *hoping* he meant me. But he didn't. So I saw I had to do something—and fast.

"I bet you wouldn't like to take a girl for a ride in that truck of yours, would you?" I asks, kind of twisting my toe in the ground.

"I sure would," he said, not letting go of my hand on account of I was holding his too tight, if you know what I mean. "Two can ride as cheap as one in this truck."

Well, that's how it all started. I think Ford Trucks are wonderful, too, now—just like Joe does.

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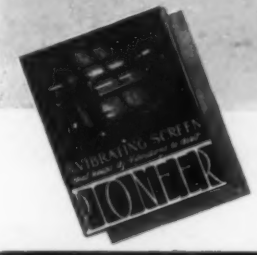

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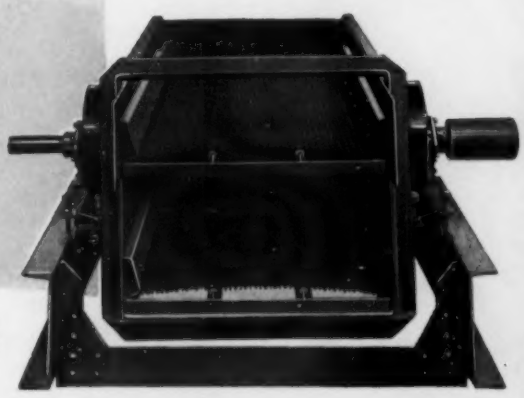
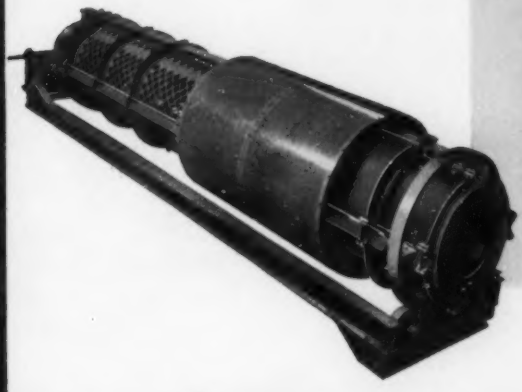


REVOLVING SCREEN



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Standard lattice frames for economical assembly and permanent value.
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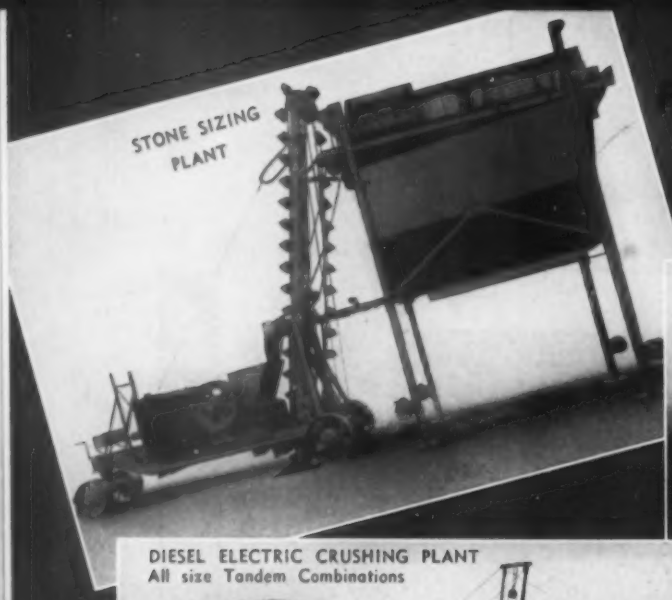

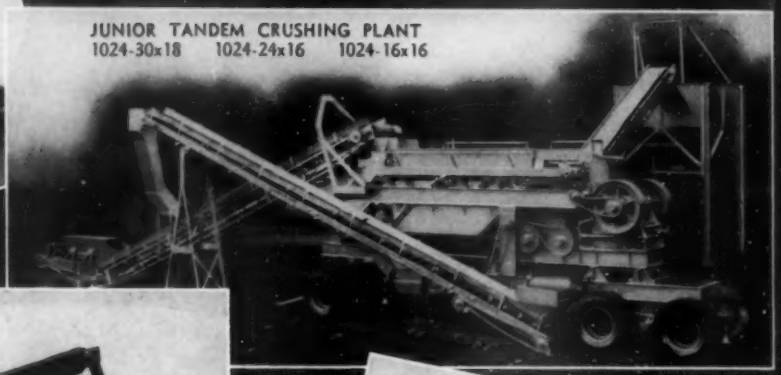

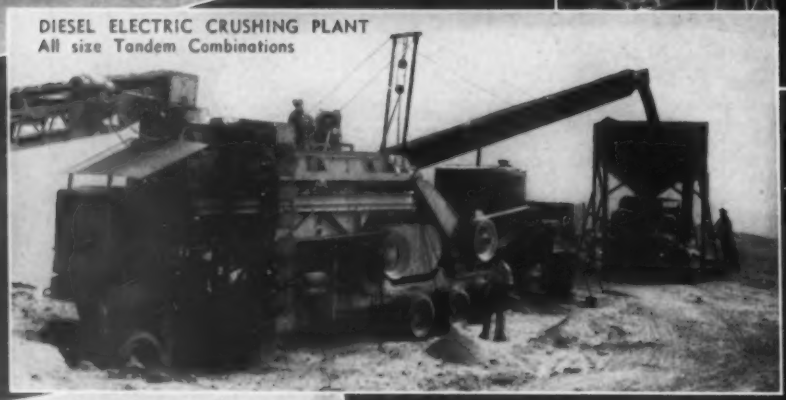

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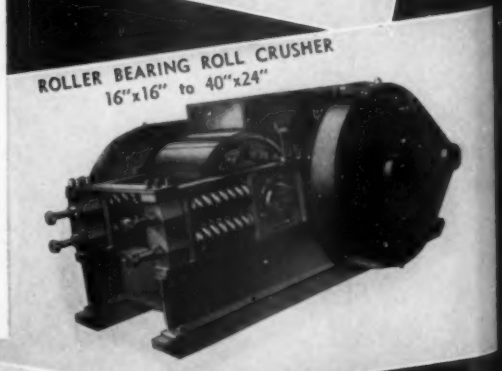

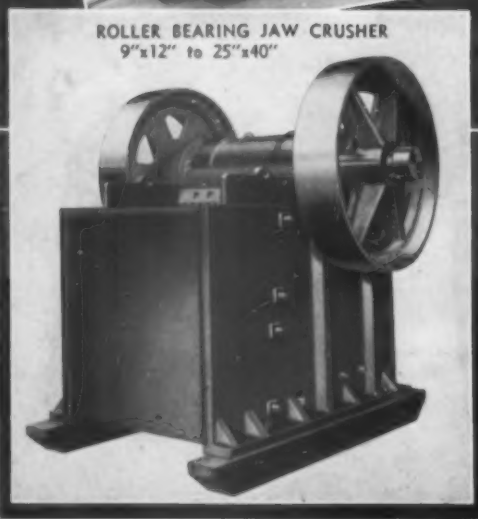

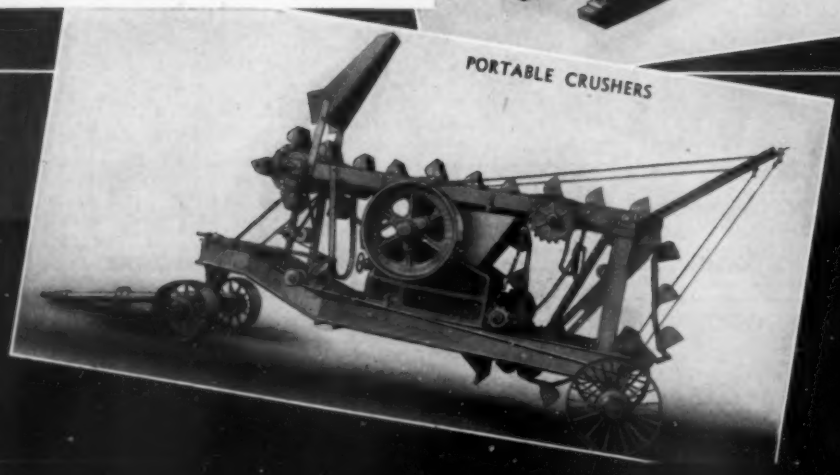

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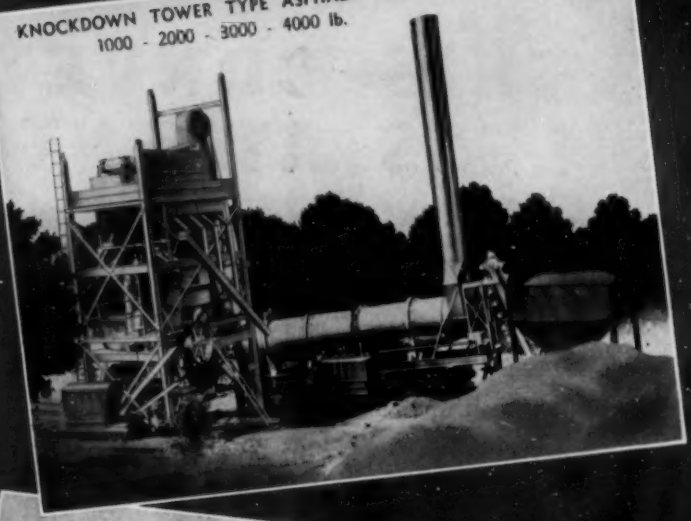

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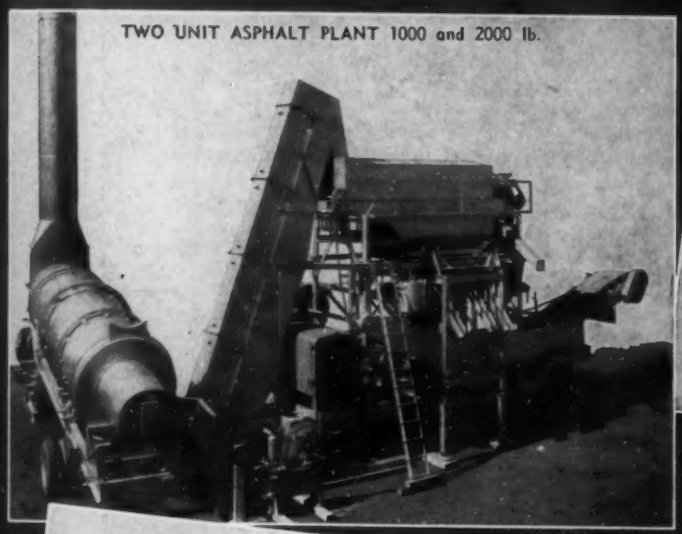

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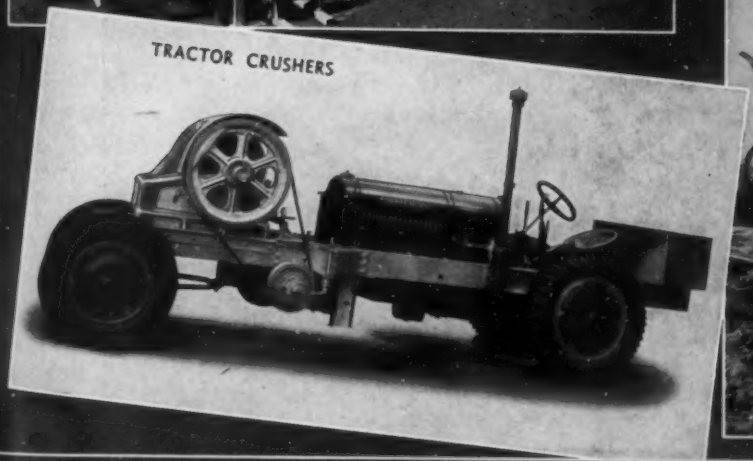

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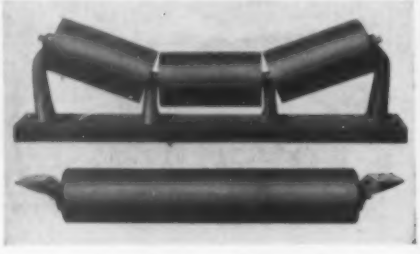
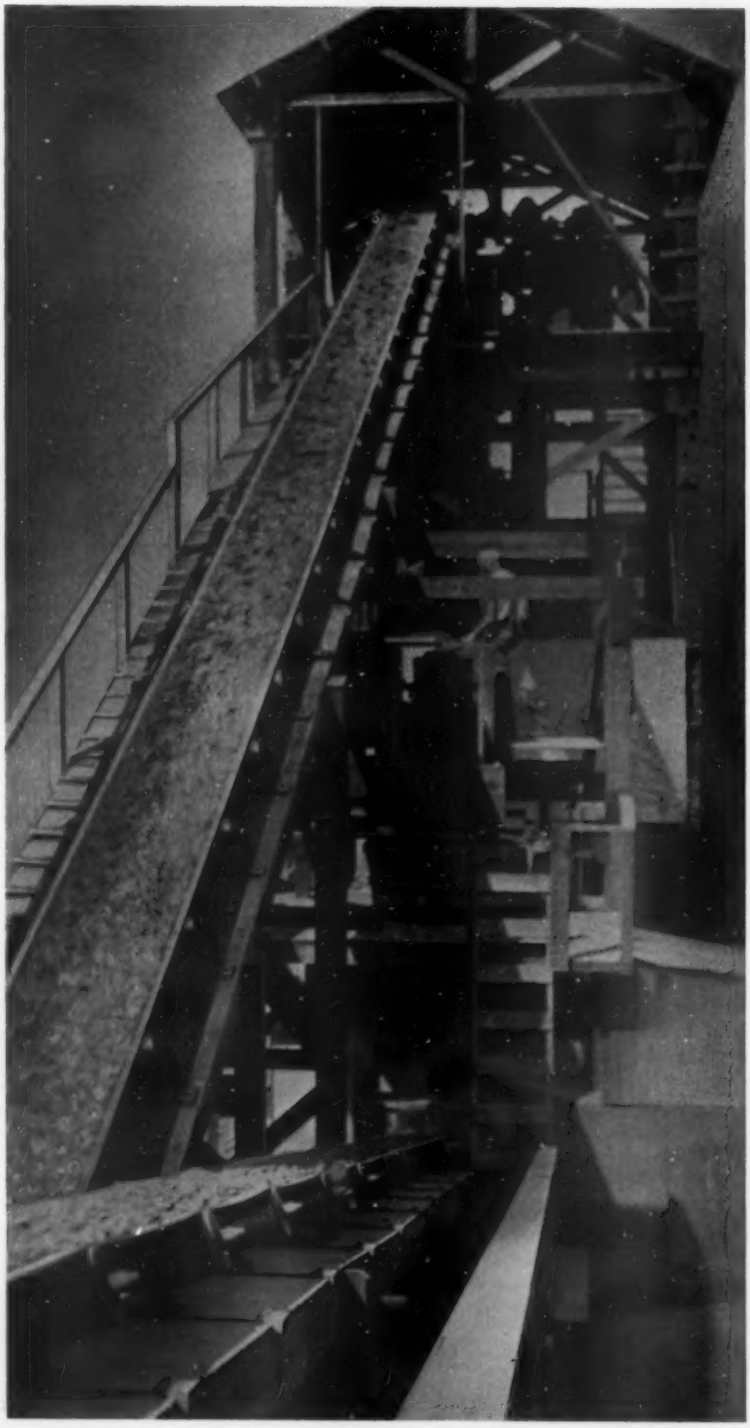
THE improved Troughing and Return Idlers used in Robins Belt Conveyors have a "triple seal" that keeps in the grease and keeps out the grit and dirt. This means clean bearings and less frequent lubrication. The patented Robins Single Shot system permits complete lubrication of the entire idler from one safe and convenient point without reaching under belts. Less time is required for greasing. These Idlers set a new standard for ruggedness, long life of both Idler and Belt and low power consumption. Robins Idlers are interchangeable with Idlers of every make. Replace worn Idlers with the Robins Improved Idlers and handle more material for less money.





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YOUNG MEN—CHEER UP!

RECENTLY in my travels about the country I have been impressed by the number of friends in this industry who are seeking young men of promise; young men capable of becoming managers; yea, even possibly presidents! After ten years of depression we are beginning to realize that some economies have been made, very probably, at the expense of future managerial personnel.

Worse than that, however, for the past seven years we have had a national government which has continually nursed the idea that America was completed, the population standing still, the frontiers gone forever, all industry controlled by "economic royalists," etc., etc. Unfortunately our government has not only unwittingly thus preached defeatism, but has done its darnedest to put its theories into practice. Producers have been discouraged and bribed from producing and things of value (wealth!) produced have been ruthlessly destroyed as superfluous!

A salaried job with one of the too numerous federal government bureaus or commissions has been the goal or ambition of many bright young men, who under normal conditions would now be junior business executives. Less fortunate or possibly less ambitious ones have drifted about as "laborers" on public works construction until they have little other ambition left than for the government to continue to provide for them. Neither group is likely to supply future enterprisers and managers of business. They have been too thoroughly saturated with the government's theory of defeatism—of "made work."

Contrast that attitude with the one exhibited by a recent visitor to our office—a refugee from one of the countries in Europe that has been over-run and conquered by a merciless foe. He had been the managing director of a portland cement works. He was driven out, barely escaping with his life and his family. With some capital he has scraped together he is seeking to reëstablish himself in our country. He wants to buy a small quarry, lime plant, concrete products plant, or something in our industry. He has never heard that America has been completed. He still believes he has an opportunity in the Land of Opportunity!

Men like him have; and so have American youths, according to a lot of old timers who have been through the mill. I didn't know how to get some of them to say so, until I hit upon the idea of asking them what kind of preparation a young man should have to enter these industries. In answer to that question several have given me considerable of their business philosophies. On one thing they all agree—there is no lack of opportunity.

None emphasizes one quality that they themselves invariably exhibit—imagination. For one does not see opportunity when it is there unless he has imagination. A man without imagination is not likely to handle anything but a routine job. Incidentally, that is another one of the blights that results from government jobs, and a bureaucratic philosophy of "buck-passing." Opportunity to the average government bureaucrat is limited to the opening created by the death or retirement of the superior immediately above him!

All our correspondents put far more emphasis on character and attitude than on education. Without exception college graduates themselves are insistent that while a college or technical education is helpful it is far from essential. Also they put emphasis on a *liberal* education, regardless of how it is acquired. This is probably the result of the past few years' experience in which business men have been at a disadvantage in the popular mind, compared with members of the New Deal brain trust.

I think it is safe to say, as a result of perusing several communications from men of great ability and wide experience, that the young man of today has far greater opportunities than his father or forefathers. He has the opportunity to become an "industrial statesman." He can start where his father leaves off, if he will accept and acquire some of the things that his father has had to learn rather late in his business life. As our guest editor on the following page says, "It is no harder for the young man to get a start than for the old man to hang on."

With this issue we start a series of guest editorials. Some are as long as the one that follows; some will be very short. All carry messages of encouragement and inspiration. They will prove interesting and helpful to the younger generation, and they will prove most interesting to the many friends and acquaintances of the authors; for, as said before, they contain a good deal of the business philosophies of these men. And what is more interesting than a well-thought-out business philosophy?

Nathan C. Rockwood

I'll Say Young Men Have Real Opportunities

Hal V. Owens, Pres., Eastern Rock Products, Inc., Utica, N. Y.

First of a series of guest editorials. This one by Hal V. Owens

Past President of the National Sand and Gravel Association

YOU ASK for a formula to make executives in our industry!

The prime requisites are guts, intelligence (by which I mean plain horse sense), the ability and liking for hard work, the knack of getting along with men, and a sympathetic understanding of the problems of his workmen. Any lad possessing all of these qualifications to a high degree will pick up everything else as he goes, and once he gets a toe hold on the ladder of any organization, will climb to its top as the smoke rolls upward. The number and amount of each of these that is in him will add up to peg his ultimate attainment.

Ours is not an industry which calls for highly specialized engineering or other technical knowledge. We use many machines, most of them heavy, rugged, and relatively simple. Specifications for our materials are made by their users, not by their producers. Individual company research is not generally necessary, and industry research is available by membership in our trade associations.

College education? Yes, if available. Desirable, but not necessary. Education is not confined to college graduates. It is available to anyone who can read, figure, think, and wants to learn.

Specialization is restrictive. The best of specialists will continue as such. Any but the best are apt to find that they have wasted a lot of time, money, and effort striving toward a goal which their basic qualifications render impossible of attainment. Any specialist who has developed into a good executive was probably a poor specialist.

Administrative engineering is a good course, but, in my opinion, bears too heavily on the technical side. Civil engineering is a good broad technical course, and carries into mechanical, electrical, and chemical engineering more broadly than they into it.

This is a mechanical age. Most boys who have grown up during the twentieth century have spent a lot of time tinkering with Model T Fords, marine engines, and electric motors; and on the average are far more machine minded than men born twenty years earlier. To young men of today, the technical problems of our industry should not be difficult to solve, either with or without an extended background of technical education.

Most courses offered by our present day colleges and universities are so circumscribed that only one or two electives are possible. An all-around executive must know something of financing, selling, credits, plant operation, construction methods, and many other subjects, all of which cannot possibly be crowded into any four years of college, and most of which must be learned in the school of experience. Whether or not the four years required for a college education could be spent to better advantage actually working in the ranks of a producing organization is a debatable question, to say the least.

Summing up on education, it seems to me that the pros and cons of the college question should be argued from the cultural point of view. It's a nice thing, if the time and money are available. In our industry, the executive with a college education will derive more benefit from it in his outside contacts than in those which he makes at his desk.

Salesmen Must Know Operation

It is very important that a salesman know, from actual experience, the capacities and limitations of the producing departments. With that knowledge properly applied, he will not sell goods which the operating department cannot profitably make; nor promise rates of delivery impossible of fulfillment. Neither will he allow a not over ambitious plant superintendent to tell him that a profitable order cannot be supplied, when the salesman knows that simple plant changes not

unduly interfering with regular operating schedules will do the trick.

Good salesmen come out of the operating department more often than the reverse order. Socially and psychologically it seems the more correct order of progress.

No young man possessing the basic qualifications of an executive is going to allow himself to be permanently held down by labor union rules, and I think we have reached the peak of this regimentation and stratification business. Labor union tyranny of today is the natural rebound from employer tyranny of the past. In the end public opinion prevails and the trend today is against the extremes of labor as formerly it was against the extremes of industry.

Is there a chance for the young fellow in our industry today? Why not? We serve, and are a part of, the construction industry. Construction volume has been dammed back by the depression; has suffered more than most, and is slower to come back. It has been so in every depression, but it always does come back; and practically always in a surge.

There is little liability in our industry that research will backfire on us to the end that other, cheaper, and more suitable materials will be found to replace those we produce. The very bulk and weight of our aggregates are essential to the stability of most of the structures in which they are used. They sell at a price per ton about equivalent to what we pay for half a pound of good candy. Substitutes will be hard to find. The long term outlook is for a great increase in demand. So at least it seems to me, and if the opinions herein expressed are anywhere near correct, few industries offer better opportunity for the ambitious youngster of today.

Today's young fellows are all right. I've seen no indication of their having any quarrel with industry. Hard to get jobs? Yes, but no harder for the boy to get hold than for the old man to hang on. They see that. It's a lot pleasanter to climb upward than to fall downward, hard and slow as the climbing may be; and, in the end, the depression boys of the thirties are going to be better off than the boom boys of the twenties.

Some men are incapable of manual labor. To any but these, the finest tools to start with are pick and shovel. The knowledge and understanding which come from the contacts made while wielding them, and the manual skill derived, will be among the most valuable assets of the future executive.

Practice Forecasting Business

Any executive able to forecast demand for his own products correctly 75 percent of the times it is brought to him will more than pull his weight in any industrial crew, even if he never contributes an ounce of effort or thought to any other business problem. Long before any embryo executive attains a position of real responsibility, he will have opportunities to make his own forecasts, and to check their outcome. He can't indulge in any more valuable practice, and if we old timers reveal what our long backward and forward looks show to us, and do it now before we forget, we may help the youngsters, and ourselves as well.

Using short words, let's divide executives into two classes—expanders and conservers. There are periods on our industrial calendar when a business, carrying out the wildest dreams of an expander type executive, will pile up tremendous book profits. Plowing back of these profits almost always goes along with such a policy, with the result that when prosperity ends, the fixed assets are away up, cash surplus is low, and credit has vanished. Trouble, if not disaster, follows.

Throughout the following depression the conserver is the man of the hour. The problem then is more to save what exists, rather than to make profits. Imagination, vision, daring are out. Cold blooded, tight-fisted penny pinching is then in order. However, the day may come when the conserver, stubbornly pursuing his policy, will sit at his desk, helpless because of lack of proper facilities, to join in the parade of progress passing his window.

These are extreme examples, of course, and I cite them merely to emphasize one of the greatest dangers facing the business executive. Fortunate indeed, for himself and his stockholders, is that one who, in addition to vision and daring, possesses sufficient thrift, caution, and will power to avoid over-expansion, and to be ready at all times to meet trouble which sooner or later will come.

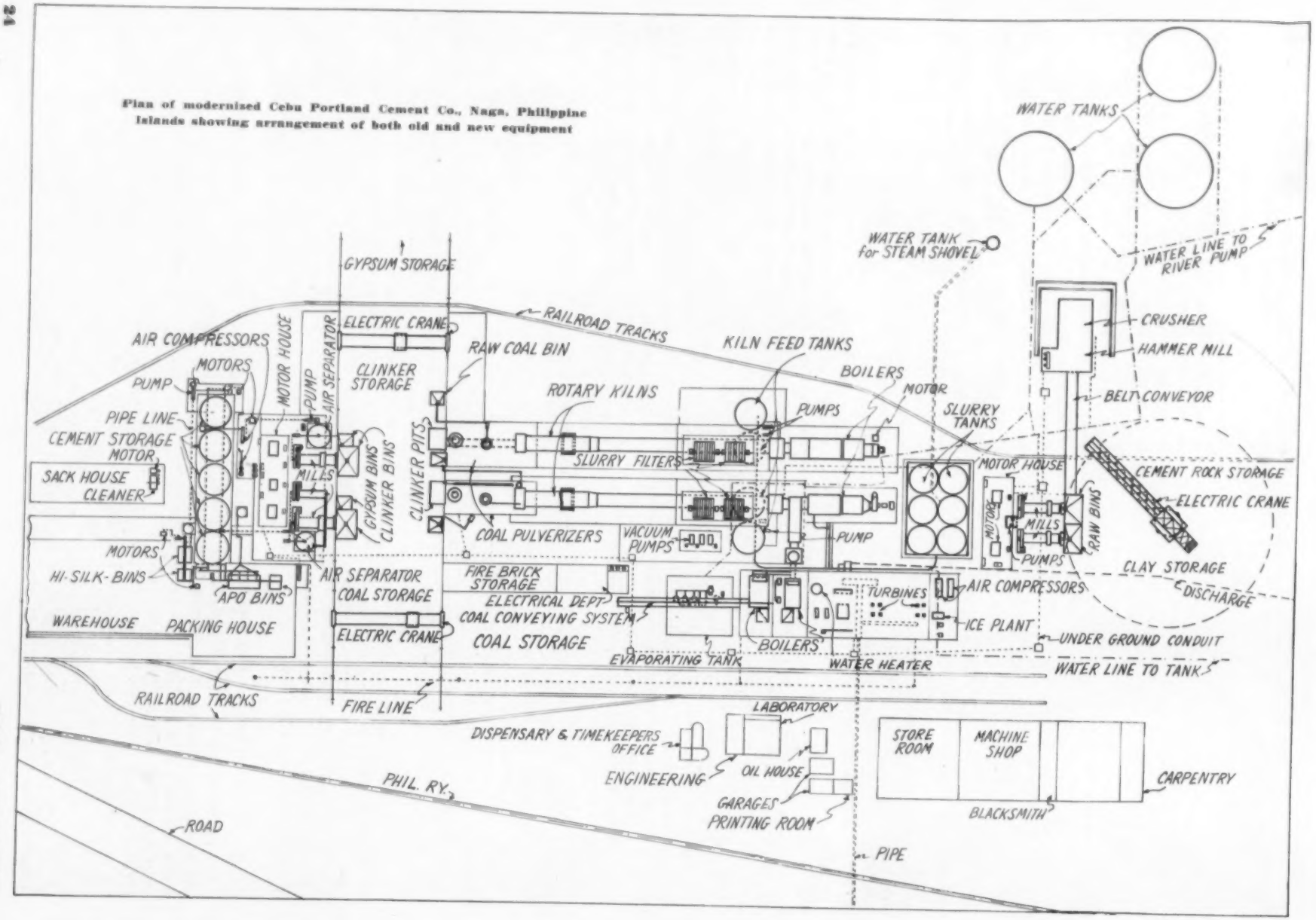
Earlier in this discussion, I gave it as my opinion that our industry offers a good opportunity to the young fellow coming into it. I think it does. However, I have emphasized the subject of conservers and expanders, and the importance to an executive of maintaining a long range viewpoint, because it seems to me that our industry is more subject than most to the hazards which go with recurring business cycles. The executive should be constantly on the alert to safeguard against them.

The aggregates industry's largest investments are in permanent plants. Our average shipping radius is short and becoming shorter. Therefore, local as well as national business conditions affect sales. There is a regrettable lack of stabilizing influences in the demand for our products. Small sales turnover, compared to investment in fixed assets, renders it necessary to scan carefully every suggested addition or improvement, to make sure it will pay out quickly. Transportation and transfer costs of our goods are high, and they occupy space out of proportion to their value. Therefore, dealers dislike to stock our goods in any quantity, and the expensive burden of inventory is almost entirely on the producer. Seasonal demand creates short cycles within longer ones.

Sufficient working capital to tide over the shorter declines and ample liquid reserves to carry through the longer ones are an absolute essential in the aggregates industry. Temptations to dip into them are ever present.

These are things for the young man to study and ponder upon while he is working up through the operating department or polishing off on sales. The sooner he gets them so fixed in his memory that they will stick like the alphabet, the longer he will stick to responsible jobs when he gets them.

Plan of modernized Cebu Portland Cement Co., Naga, Philippine Islands showing arrangement of both old and new equipment



Spend Million—Triple Capacity

Duplicate kiln and grinding units of Cebu Portland Cement Co., and increase capacity from 1000 to 3600 bbls. per day

By EDUARDO TAYLOR*

THE Cebu Portland Cement Co., owned by the Commonwealth Government of the Philippines, has just completed an extensive modernization and enlargement program in its plant at Naga, Cebu, P. I., and now has a producing capacity of 3600 bbl. daily.

Originally a single unit plant having one raw mill, one 175-ft. rotary kiln and one finish mill, with a daily capacity of 1000 bbl., the plant has now been enlarged with a duplicate unit. A brief summary of the additions and improvements made recently at a cost of about $1,000,000 follows:

(1) Erection of a duplicate unit consisting principally of:

one 7-ft. x 26-ft. wet grinding raw mill (Allis-Chalmers).

one 10-ft. x 11-ft. x 175-ft. rotary kiln (Allis-Chalmers).

one 800-hp. waste-heat boiler (Keeler).

one direct-firing coal pulverizer (Babcock & Wilcox).

one set of slurry filters (Oliver United).

one air-quenching clinker cooler (Allis Chalmers).

one 7-ft. x 26-ft. clinker grinding mill (Allis-Chalmers).

one 16-ft. cement air-separator (Raymond Bros.).

Fuller-Kinyon cement-conveying system.

one 5-ton traveling electric crane (Harnischfeger).

one 3000-kw. Turbo-generator (Stal).

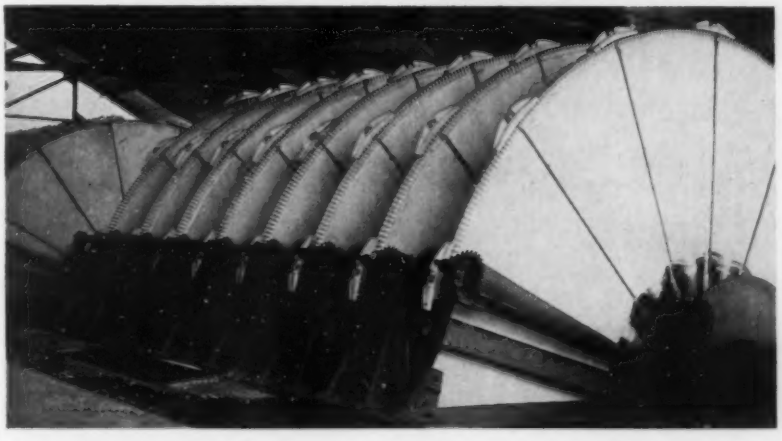
and accessory equipment to complete the plant.

(2) Prior to the installation of the duplicate unit, improvements on the existing plant were made as follows:

One of the two 175-ft. kilns, each of which is 11-ft. diameter at the burning zone and 10-ft. diameter for the rest of the length

Installation of slurry filtration equipment (Oliver United) on the first kiln. A Babcock & Wilcox direct-firing coal pulverizer was installed to displace the old bin system consisting of a coal dryer, ball mill and powdered coal bins and conveyors. The ball mill thus released was transferred to the clinker grinding department to increase cement grinding capacity. Rejects from the Raymond separator are fed to this mill (Allis-Chalmers 5 ft. x 22 ft). An electric revolving crane (Washington Iron Works) was erected in the raw material storage for handling the cement rock and clay and for feeding the raw mill hoppers. Formerly a locomotive crane performed this duty. A 1500-kw. turbo-generator (Stal) was added to the power plant as well as a 450-hp. Keeler auxiliary boiler. A new concrete office building and a combined timekeeper's office and first-aid building were also erected.

Slurry filtration equipment consists of two 9-disc and two 8-disc continuous vacuum filters arranged as shown in the illustration below



Raw Materials and Process

A description of the plant of the Cebu Portland Cement Co. was published in ROCK PRODUCTS several years ago (May 7, 1932, p. 17), but inasmuch as a considerable number of changes, improvements and additions have been made recently, a brief description of the present plant follows:

The raw materials used consist of an argillaceous coral limestone and an alluvial clay. The limestone deposit, which is situated right at the plant site has the following typical analysis:

*General Superintendent, Cebu Portland Cement Co., Naga, Cebu, P. I.

Two 7- x 26-ft. Allis-Chalmers Compeb type raw mills driven by 500-hp. synchronous motors

	Percent
Loss on ignition	37.98
Silica	8.75
Alumina	4.27
Iron oxide	1.34
Calcium oxide	47.20
Magnesium oxide	0.60
Lime as calcium carbonate	83.5

The clay is found as an alluvial deposit in a valley about half a mile from the plant site. Its composition is as follows:

	Percent
Loss on ignition	22.85
Silica	35.06
Alumina	9.34
Iron oxide	3.78
Calcium oxide	26.38
Magnesium oxide	.88
Lime as calcium carbonate	47.00

Practically inexhaustible quantities of these raw materials are found right at the plant site. A Marion No. 61 steam shovel is used for quarrying the cement rock from the hillside. The bucket dumps the rock into 5-cu. yd., steel, dump cars which are transported by 20-ton Davenport steam locomotives to the crushing plant. The clay deposit is worked by a Marion No. 450 steam shovel and by contract labor.

The crushing plant consists of a 24-in. x 60-in. Fairmount roll crusher, a 35-in. x 60-in. revolving grizzley, and a No. 5 Williams Jumbo hammer mill. The rock fed to this crushing plant ranges in size from 24 in. down and is reduced to 1½ in and smaller. The crushed rock is received on a 24-in. inclined belt conveyor, 134 ft. long, center to center, and is deposited in an open storage space in front of the raw mills. This storage is served by a 5-ton electric revolving crane with a clamshell bucket for reclaiming the raw material and filling the raw mill hoppers

The raw mills are 7-ft. x 26-ft. Allis-Chalmers Compeb mills driven by 500-hp. synchronous motors. There are two of these mills. The slurry is ground to a fineness of 93 percent passing 200-mesh and contains 36 to 37 percent water. Wilfley pumps carry the slurry to six steel storage tanks of 800 bbl. capacity each.

Correcting Slurry Composition

Correction of the composition of the slurry is made in four submerged concrete tanks. These tanks, as well as the steel slurry tanks, are equipped with Minogue agitators. Wilfley pumps elevate the slurry from the correction tanks to the slurry filters of which there are two sets, one set serving each of the two rotary kilns

The slurry filtration equipment consists of two 9-disc and two 8-disc continuous vacuum filters. Vacuum is obtained from three Worthington dry vacuum pumps, driven by 40-hp motors. Each set of filters is served by a belt conveyor, 36 in. wide and 50 ft. long, which receives the dewatered filter cake and feeds it to the kiln through a Kronstad shell type kiln feeder. The filters dewater the slurry from a moisture content of 38 percent down to 20 percent.

There are two 175-ft. kilns, 11 ft in diameter at the burning zone and 10 ft. in diameter for the rest of the length. Both kilns are direct-fired with No. 156 B&W coal pulverizers. The newer kiln is connected to an Allis-Chalmers air-quenching clinker cooler which cools the clinker to atmospheric temperature.

Two 5-ton electric traveling cranes with clamshell buckets serve the clinker storage building and also handle coal and gypsum to the corresponding bins.

Clinker grinding is done by three Allis-Chalmers Compeb mills (two No. 726 and one No. 522). The large mills are connected in closed circuit with Raymond separators (14-ft. and 16-ft.).

There are five cement silos each with a capacity of 5500 bbl. Fuller-Kinyon pumps as well as bucket elevators and screw conveyors handle the cement from the mills to the silos and from the silos to the packing bins.

This plant generates its own power The two kilns are connected to two 800-hp. waste-heat boilers which produce most of the required steam. Two auxiliary boilers of 450 hp. and 300 hp. are available when needed.

The power generating equipment consists of:

one 1250-kw. Allis-Chalmers condensing turbo-generator;

one 1500-kw. Stal condensing turbo-generator;

and one 3000-kw. Stal condensing turbo-generator.

All have the following characteristics: 3600 r.p.m., 2300 volts, 3-phase, 60-cycles.

The first two turbines serve as stand-by units should the 3000-kw turbine have to be stopped for repairs or cleaning.

The officers of the Cebu Portland Cement Co. are Eulogio Rodriguez, chairman of the board and general manager; Rufino Melo, comptroller, Fidel Reyes, secretary-treasurer; Jesus J. Santos, sales manager; M. de Jesus, purchasing agent.

Office of the Cebu Portland Cement Co. is of unusual design

Washing–Classifying Sand

Part 10.—Elements of design of simple classifiers and their efficient operation

By EDMUND SHAW

When the writer's acquaintance with classifiers began, they were practically all homemade. The rock products industry hardly used them at all, and most of them were installed in lonely mining camps, so far from machinery houses that everything that could be homemade was homemade.

Much of the commercial sand produced in those days was prepared by being dug from the bank with a shovel, wheeled to a little standing screen where it was fed with the same shovel, and then loaded with the same shovel into a dump cart. Only very particular people thought it necessary to wash sand, and there were books that said that concrete sand was better for having a little mud in it. [If the "mud" is 100-mesh silt, we are beginning to appreciate that the old books were right.—Editor.]

Today hardly anyone in the industries that use them thinks of making a classifier. There are a few who have special reasons for building them. There are those who operate river dredges in the West and South, producing only sand, those who wish to experiment with new types of classifiers, and those who still think that they can build more cheaply than they can buy such machines. Usually, in the end, they wish that they had bought.

But this chapter is not written for those who want to build, for the writer believes that every producer should understand the theories by which the machines he uses are designed. It would save many a bad mistake if the buyers of machinery thoroughly knew the hows and whys of its design and construction.

Classifier for Pump Dredging

Traveling along near the rivers of the Mississippi Valley and the Gulf and South Atlantic Coastal Plains, one often comes across a pump dredge, or a small flock of them if in the neighborhood of a good-sized town. Most of them will be pumping sand, for gravel is scarce over a large part of that country.

The equipment does not vary so much; most of the dredges have a 6-in., an 8-in., or a 10-in. pump, and they pump through a pipe line supported on pontoons to a classifier on the shore. It is never called a classifier; it is a box or a bin, but it *is* a classifier in design and function.

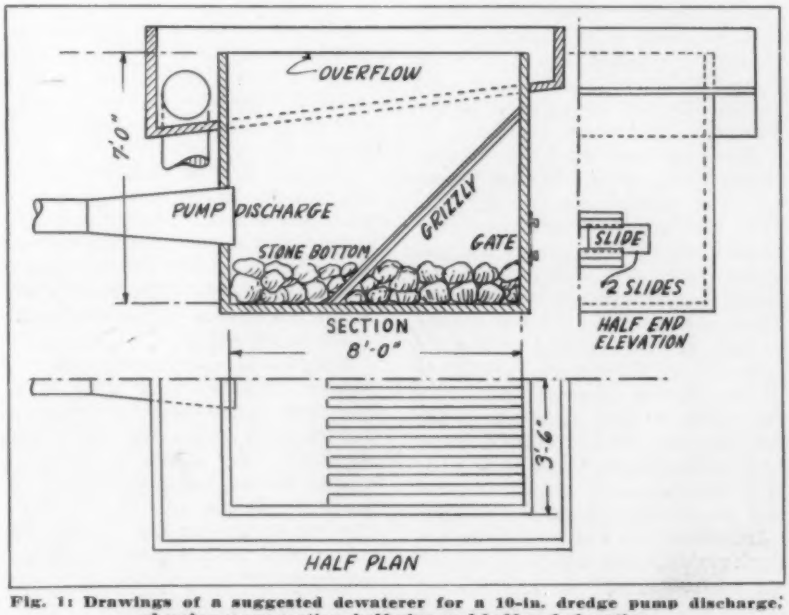


Fig. 1: Drawings of a suggested dewaterer for a 10-in. dredge pump discharge; showing cross section, half plan and half-end elevation

The usual arrangement is for the pump discharge to go into a box of some kind to kill the shock. Then it flows from the box over a rather flat screen, the slope being just enough so that the gravel and trash will travel on it to the bottom where it is raked off. The screen has usually a long mesh, ⅜-in. by 1¼-in. being a common size. Where there is much trash it may require considerable attention, but in some localities it has to be visited only a few times every day. The undersize of the screen flows, with practically all the water that is pumped, to the classifier, which for the sake of simplicity will be hereinafter referred to as the "settler."

Ordinary settlers are 6 ft. to 8 ft. wide and 16 to 18 ft. long. Occasionally one sees a shorter one; and many settlers would give a better product if they were cut off. The cross-section is triangular, the sides being about 30 deg. from the vertical. Occasionally one sees a very narrow one, built that way probably in the hope that the sand discharge would not "break through" so often. There are three or four gates on the side, at the bottom, through which the sand flows as a thick pulp, usually directly to railway cars. If deliveries are by truck a common way is to run the sand to a pile on the ground from which it is put into a stock pile by a crane or a bucket on a boom derrick, which also fills the bin from which the trucks take their loads.

The difficulty with this method is that the settler *classifies*, settling the coarse sand near the entrance and the fine sand near the discharge. No two spigots run the same product, and this does not make for uniform carloads, although the product may be fairly uniform where it is stockpiled by a crane. Even so, it would be better if the settler could be made to discharge a uniform product from all spigots continuously, and still better if the grading of the product could be controlled.

The writer has designed a few settlers and other arrangements for dewatering and classifying pump dredge discharges, working in widely separated parts of the country. He has

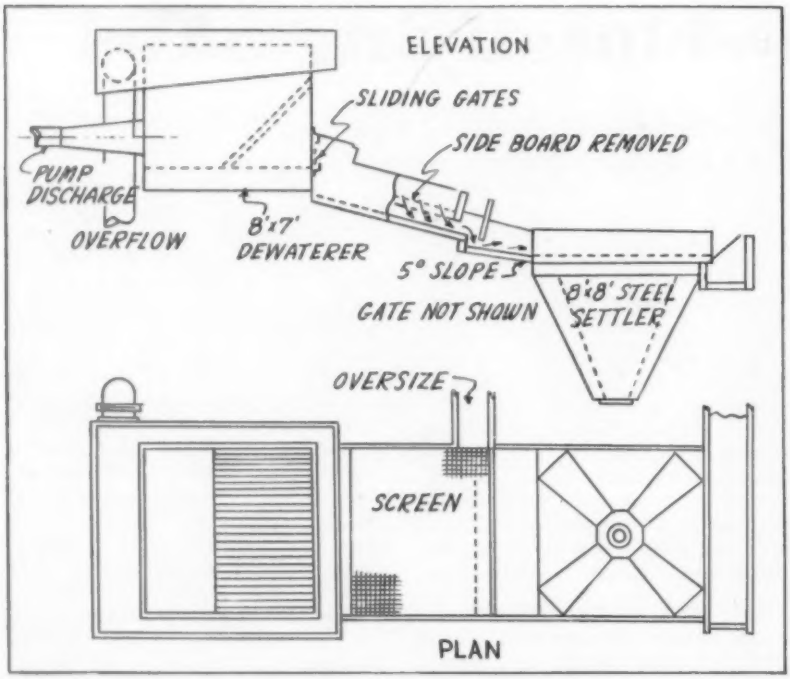


Fig. 2: Elevation and plan details of a suggested dewaterer and settler for a 10-in. dredge pump discharge

thought a great deal about improving the work of the ordinary settler, and for this reason he offers a few suggestions here.

The ordinary way is to run the current through the settler from end to end, lengthwise. This makes a surface current classifier out of it, coarse at one end, fine at the other. If it is desired to settle a uniform product in every part of the settler, the most obvious thing to do would be to run the flow crosswise, from side to side.

I once saw a settler fed that way, but can remember no more about it than that it was in one of the South Atlantic States. It does not seem a good solution to the problem, for too large a part of the settling area would be disturbed by the eddies that are always present where the current enters and overflows.

For several reasons, including economy, if the long settler is to be abandoned, it would be better to go to a square form. This can be made as a truncated pyramid with a single gate at the bottom, which is best where one uniform product is wanted. The corners of the pyramid would have to be filled in to prevent the sand from hanging up, but the construction offers no great difficulty, especially if it is built of steel.

To take a concrete case, suppose a settler is wanted to take the discharge of a 10-in. pump with a pipeline velocity of 15 ft. per second, containing 7 percent of solids by volume. This is 8.17 cu. ft. per second, of which 7.63 cu. ft. is water and 0.54 cu. ft. is solids. If the solids weigh 165 lb. per cu. ft., this would be 170.46 tons per hour, but a large part would be discarded as clay and unwanted fine sand, so that probably not more than 125 tons per hour would be saved.

To meet present Federal specifications at least 15 percent of the sand must be finer than 48 mesh. With so large a proportion of minus 48 mesh sand in the feed as is generally found in river sands, it is possible that a split on the 48 mesh might leave the desired 15 percent passing, but to be safe, in this case the area will be figured for a split on the 65 mesh.

There are two ways for figuring the area of a surface current classifier. That which the writer has more often used is to find the depth of the current from the head over the discharge weir, and then making the settler long enough or wide enough so that a particle of the size it is desired to save will have plenty of time to settle out of the current. The other is the method given in Taggert's Handbook of Ore Dressing, which considers the surface current equal to a rising current of the same area. It is simpler to use than the other, and the results are about the same.

In this case we wish to split the 65-mesh grains, so the velocity of the rising current should be equal to the falling rate of the average 65-mesh grains. If this is not known it should be found by the falling rate tube, as described in Part 5, ROCK PRODUCTS, September, 1939, p. 36. Here the rate will be assumed to be that given for sands of this kind in Part 5. For average 65-mesh grains the rate is 1.1 in. per second. This is 0.0915 ft. per sec., and this figure should be the rising current velocity.

The formula for this velocity is Velocity (v) (surface or horizontal) = Quantity of pulp (Q) divided by area of cross-section (breadth x depth at overflow (a). Substituting we have, $a = Q/v$, or 8.17/0.0915, which is 89.5.

The square root of 89.5 is 9.5, so the practical thing to do would be to build the settler 10 ft. square. If it is found to settle too much fine sand, the area could be cut down by partitions placed at the sides (to increase velocity), which would not have to go far below the water.

Partial Dewatering Before Settling

The discharge from a sand pump has to go to some kind of a box to break the shock so that the pulp will run evenly over a screen. It is a simple matter to make this box a dewaterer that will get rid of much of the clay and fine sand not wanted in the product, with so much less water that a smaller settler can handle it, than the settler described in Part 10. One does not want the box to be too small, however, because it must contain a sufficient body of sand to permit variations without the discharge "breaking through." A settler 8 ft. by 8 ft. would have a capacity of 8.17 cu. ft. per sec. and the area, 64 sq. ft. being 64 percent of the 10 x 10 ft. area which was figured in Part 10, we may compute the surface area of the preliminary dewaterer to over 36 percent of the volume of the feed, or 2.94 cu. ft.

We may use the same method as before, and assume that the rising velocity is to be 0.05 ft. per sec., which is half of what it is in the settler. The quantity divided by the velocity is 2.94/0.05, which is 58.8, the required square feet of area. A box 7 ft. x 8 ft. would do the work.

A sketch of a dewaterer with the required dimensions is given here. The feed comes in through an expanded pipe. While the writer has never seen this in use, it seems to him to be an excellent method of breaking the shock of the discharge. The expanded portion should be longer than the length of the spouting discharge.

(To be continued)

Breakage and Segregation

ARTICLE ELEVEN

On crushing, sizing, testing and specifying of aggregates reveals how breakage and segregation may affect gradings

By ELWOOD T. NETTLETON

IT IS QUITE APPARENT to anyone acquainted with crushed stone that there is some breakage in the stone after it has been screened in the plant. This may occur in numerous places such as falling from screens or chutes into bins, from bins into transportation vehicles, and by handling into and out of stock piles.

This problem of dealing with changing indeterminates is very complicated and complex. No two batches of stone receive exactly the same treatment from the screen at the quarry, through the various processes until it is placed on the job miles away. It is quite evident that the amount of breakage varies considerably, according to the physical and chemical properties of the rock. In these tests trap rock was used. These results would differ considerably for other types of stone. However, inasmuch as the specifications usually require stone to meet the requirements from samples taken on the job, any large amount of breakage is of considerable importance to the producer.

With this in view, it was determined to run tests to see whether any general conclusions might be obtained. It was noted in common practice that stone was very seldom dropped from a greater height than 20 ft. It further seemed apparent that stone was usually dropped on other stone, wood, or steel. Probably the greatest amount of breakage occurs on the steel bottom of a flat bottom railroad car. With the latter condition in view, fourteen tests were run, dropping various sizes of stone from heights of 20, 15, and 10 ft. on a flat steel plate.

It is rather hard to draw any definite conclusions as the results were not as consistent as they might be. For the sake of comparison only the percentage of breakage on each screen for each test was added up, disregarding negative results.

DROP IN FEET

Commercial Size	20 ft.	15 ft.	10 ft.
2 in.	10.4	7.3(4.8)	0.9
1½ in.	4.0(7.4)	7.5(8.4)	
1 in.	12.8	5.0	
¾ in.	16.1	14.6	
½ in.	6.4	5.7	

(Note: Figures in parentheses are second dropping of that particular stone.)

From a study of this it appears quite evident that for drops of 10 ft. or less there appears to be negligible breakage in trap rock.

It was first thought that the initial drop due to thin corners would cause more breakage than any recurring drops. This did not prove to be the case, however, as in two out of three tests the stone dropped a second time from the same height showed more breakage. This is probably explained by the fact that whether a particular stone breaks or not is dependent upon the exact angle or edge it hits.

It was quite evident that the sample of ¾-in. stone broke down much more than any other size. This is probably due to the large number of flat and elongated shapes in this size. These pieces are really chips from initial crushing. Should the 2-in. stone be recrushed making ¾-in. stone, it is believed that the resulting recrushed ¾-in. would not show the above breakage due to the predominance of cubical pieces. Possibly further tests should be run along this line.

Segregation in Bins

Stone is known to segregate in the bins, especially those of the flat-bottom type. Just how much segregation and remixing takes place has always been a debatable question. It was decided to run tests only on the larger sizes of stone which tend to segregate the most. Owing to the layout of bins and chutes at the quarries, only three tests were possible, and one of these had to be discarded because of the poor arrangement of chutes. The other two tests, however, clearly pointed out this tendency to segregate and the

PERCENT BREAKAGE DUE TO FALL OF STONE

Test	56A	57A	57A	45A	58A	58A	59A	59A	61A	62A	63A	64A	65A	66A
Size	2 in.	2 in.	2 in.	2 in.	1½ in.	1½ in.	1½ in.	1½ in.	1 in.	1 in.	¾ in.	¾ in.	½ in.	½ in.
Drop	20 ft.	15 ft.	15 ft.	10 ft.	20 ft.	20 ft.	15 ft.	15 ft.	20 ft.	15 ft.	15 ft.	20 ft.	15 ft.	20 ft.
Drop No.	1	1	2	1	1	2	1	2	1	1	1	1	1	
2½ in.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	...	...	...	...	...	...
2 in.	5.1	0.0	1.0	-0.1	3.0	0.0	0.0	0.0	...	...	...	...	...	...
1½ in.	2.9	5.6	2.7	0.5	1.0	1.2	1.4	3.1	0.0	0.0	0.0	0.0	...	...
1 in.	1.4	1.3	0.7	0.4	-0.2	3.3	2.8	2.8	5.4	-0.1*	0.0	0.6	...	...
¾ in.	0.6	0.3	0.3	-0.0	-0.6	1.7	1.6	1.3	5.1	3.5	7.2	5.8	0.0	0.0
½ in.	0.4	0.1	0.1	-0.0	-0.8	0.8	0.8	0.8	1.8	1.4	3.6	4.2	2.0	0.5
⅜ in.	...	...	...	...	...	...	...	...	...	...	2.1	1.8	1.9	4.8
¼ in.	...	...	...	...	...	0.4	0.5	0.4	0.5	0.1	1.7	0.7	1.8	1.1

* Negative results are due to loss of dust on dropping.

MIDDLEFIELD TESTS

2-in. Commercial 2⅝ Square-1¾ Square

	Test No.	Chute	Percent Passing				
			2½	2			½
	292	3	100	80.0	12.8	1.4	0.7
	288	4	100	89.2	32.2	5.5	1.2
Average			100	84.6	23.0	3.5	1.0
Difference	324	2nd Outside	95.7	78.5	11.3	1.5	0.5
			4.3	6.1	11.7	2.0	0.5
	131	3	100	94.5	29.7	3.2	0.8
	120	4	100	88.8	39.4	4.1	1.3
Average			100	91.6	34.6	3.7	1.1
Difference	121	2nd Outside	100	83.0	12.3	1.2	0.9
			0	8.6	22.3	2.5	0.2
	26	3	100	91.0	23.0	4.7	1.3
	29	4	100	75.8	26.8	11.1	7.8
Average			100	83.4	24.9	7.9	4.6
Difference	31	2nd Outside	100	82.2	17.4	2.0	1.3
			0	1.2	7.5	5.9	3.3

Maximum Differences—11.7—22.3—7.5 Average 13.8

advisability of using V-bottom type bins to overcome this segregation as well as eliminate much accumulation of dust and dirt.

The actual calculated segregation in one case was calculated as 27.8 percent and in the other as 13.8 percent.

Segregation in Stock Pile

Unfortunately, all quarries did not have all sizes in stock. Some quarries had stock piles where stone recently crushed had become mixed with the same commercial size of previous years. The older stone in many cases was screened through various sizes of openings, possibly of from ⅛-in. in the smaller sizes, to ⅜-in. in the larger. Naturally, any tests on this combined stock would give erroneous information.

With these omissions, 75 gradation tests were run at the six plants in an attempt to determine (under different methods of handling) the amount of segregation in 23 stock piles of various sizes of stone. As a result of these tests the following conclusions may be drawn:

(1) 2-in. mixed stone is the worst offender for segregation.

(2) Next is 2-in. and 1¼-in.

(3) Practically no segregation occurs in ¾-in. and ½-in. stone.

(4) Slight segregation usually of no importance occurs in the screenings.

(5) Where stone is dumped over a bank more segregation occurs than when dumped on the flat.

(6) In general, the greater the height of the bank, the greater the segregation.

(7) Where stone is properly rehandled and reclaimed by cranes, no segregation occurs.

(8) Where stone is rehandled and reclaimed by steam shovel, some segregation occurs. Segregation is very noticeable if the material has not been rehandled several times.

(9) Because of the dust from crushing operations, the stock piles of stone to be used with bituminous materials should be located at some distance from the plant. Screenings could be located close to the plant.

(10) Stock piles should either be eliminated from quarry floors or more care should be taken, after primary and secondary blasting, to remove oversize material which may have been blown on top of these piles before more of the crushed product is added.

(11) Shovel or crane operators should leave at least a foot of loose stone under their digging operations while working in a stock pile. One bucket containing a large amount of soil or screenings can spoil a large tonnage.

The actual amount of maximum difference occurring in the 23 stock piles tested varied from 7.1 to 46.9 percent with an average of 18.2 percent deviation from the normal.

This figure, as compared with 15 percent from the normal as the maximum deviation between any test and the normal plant averages, would give a balance of 18.2 percent minus 15 percent or 3.2 percent as the measurement of the average stock pile segregation. This 3.2 percent would no doubt be offset by loading, as the clam shell or bucket reclaims material for shipment.

Tables above and below combine tests for segregation of larger sizes of stone in bins. Results show that these larger sizes have more of a tendency to segregate than do the smaller

GRANBY TESTS

Mixed Stone 2½ Square-⅞ Square Crusher Run Between These Sizes

	Test No.	Chute	Percent Passing Square Openings				
			2½	2	1½	1	½
	91	2	100	80.8	37.7	9.6	1.0
	86	3	100	76.6	43.2	11.3	0.7
Average			100	78.7	40.5	10.5	0.9
Difference	90	Outside	92.7	45.1	15.4	3.2	0.6
			7.3	33.6	25.1	7.3	0.3
	231	2	100	96.6	70.4	24.6	2.4
	234	3	100	94.9	65.8	27.2	15.8
Average			100	95.7	68.1	25.9	9.1
Difference	239	Outside	100	84.3	47.6	8.7	1.0
			0	11.4	20.5	17.2	8.1

Maximum Differences—35.1 and 20.5 Average 27.8

Segregation in Transportation

Therefore, it might be concluded that where the stone is properly handled and reclaimed, even coarse sized stone may be built up in layers to a maximum of 30 ft. without noticeable segregation. When crushed stone is improperly handled, segregation up to 46.9 percent minus 15 percent or 31.9 percent is revealed.

Segregation in railroad cars takes place to a similar extent as in bins. Besides this phenomenon there is a shaking or vibrating action of the car in transit which has a similar effect on stone as a shaking screen in which the fines tend to go down and the coarse up. Weather is another factor. The stone when loaded may appear fairly clean although it carries some dust. When rain hits the stone in transit, the dust is gradually washed down into the hoppers of the car or lower layers. This makes the stone look exceptionally clean on top, but when the hopper is opened, out comes the dirty stone. Inexperienced inspectors will often accuse quarry operators of piling clean stone on top of dirty stone when loading, expecting that the inspector will only look or sample the easily accessible top of the car. The same phenomena may also take place in trucks due to vibration, although not to so great an extent.

(Continued on page 32)

Clinker Cooling—No Mystery

No evidence exists that additional heat is evolved in the clinker cooler through exothermic reaction

By A. W. CATLIN*

WE ARE NEARING THE TIME when we may count that day as lost and completely null and void if some one does not come forward with the performance record of an air-quenching cooler indicating an efficiency of the heat exchange ranging anywhere from one hundred to two hundred per cent. Occasionally in these circumstances an investigator, who looks beneath the surface, will discover that something is amiss in the heat balance. Seeking a convenient explanation, he customarily falls back on the assumption that additional heat over and above the available heat content of the clinker is evolved in the cooler through an exothermic reaction between the clinker and the cooling air, appearing as preheat in the secondary combustion air volume.

From published data concerning the performance of a typical two-stage cooler of this type, it is possible to calculate the efficiency of the heat exchange, and on the second stage this is found to be in the neighborhood of 70 percent. It is reasonable to conclude that first-stage efficiency is necessarily somewhat lower than this, due to the higher temperatures involved resulting in increased heat losses. When it becomes necessary to boost this first-stage efficiency; for example, from a possible 60 percent to 180 percent, the operation imposes a considerable strain not only on the exothermic hypothesis, but on the credulity of the reader as well.

CHEMIST'S CORNER

Problems and practices of the chemists in the industry are discussed on these pages. Contributions and comments are invited.

It may be of interest to examine more in detail into some of the claims made concerning cooler performance, and the following results selected at random and "compiled from actual performance" are typical. In this case the figures quoted are said to apply in general to a particular design of cooler and do not refer to any specific installation.

Temp. F. clinker to first cooling stage	2,000
Temp. F. clinker from first cooling stage	900
Heat recovered, B.t.u. per bbl. of clinker output	300,000

A further perusal of the reported results reveals that "two-thirds of this is actual heat returned to kiln in preheated primary and secondary air. The remaining third is due to the efficiency of the patented adjustable burning equipment usually furnished with each cooler."

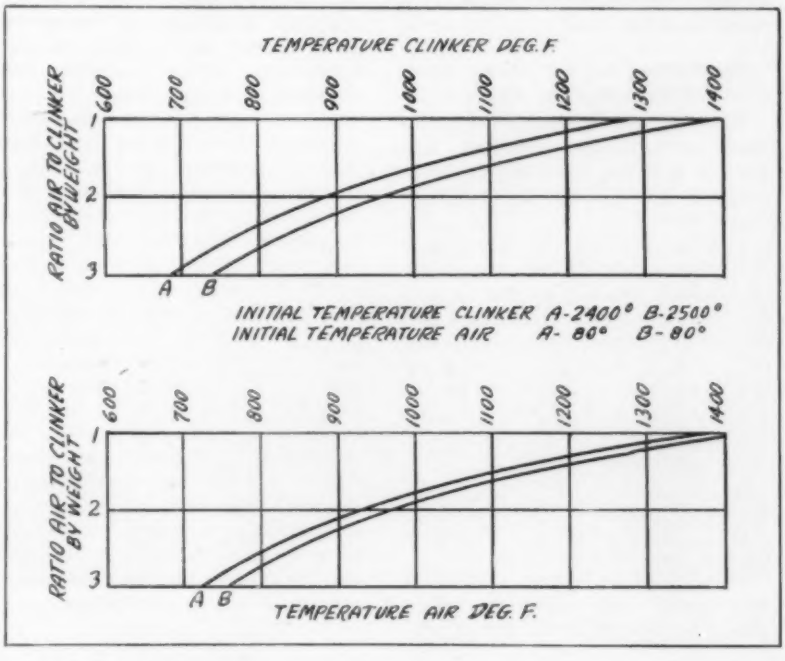
Taking one bbl. of clinker as representing 365 lb., we have,

B.t.u. in one bbl. clinker at 2000 F.	172,645
B.t.u. in one bbl. clinker at 900 F..	69,350
Total B.t.u. available in clinker (difference)	103,295
Reported B.t.u. recovery from clinker	200,000
Efficiency of heat exchange, per cent	193.6

Calculating Efficiency of Clinker Cooler

Dr. Martin has investigated the subject of preheat at length.** In the course of his discussion he develops formulas which enable him to calculate and tabulate theoretical temperatures of preheated air from outgoing clinker in kilns producing different yields of clinker. These tabulated values, which range from a datum temperature of 60 deg. F. to a limiting temperature of 2500 deg. F., cannot fail to be of interest to the physicist, but contribute little of practical value. Dr. Martin fully recognizes this fact, as he says, "The heavy loss of heat from the coolers by radiation, however, would greatly reduce the efficiency of the heat interchange between the air and the clinker, and it may be well doubted whether in many modern rotary kilns the mean tem-

Heat recovery performance curves showing final clinker and air temperatures



* Representing Manitowoc Engineering Works, Chicago, Ill.

** Researches on the Rotary Kiln in Cement Manufacture by Geoffrey Martin.

perature of air where it meets the coal dust possesses an average temperature much exceeding 400 deg. F." Possibly this is a satisfactory figure when referring to the rotary cooler, but it would not be questioned today that the modern air-quenching cooler provides a much higher degree of preheat.

Because of numerous variables, any attempt to develop workable cooling and preheat formulas with exactitude is practically out of the question. However, it may be possible from operating results to assign to coolers certain performance characteristics without depleting the Greek alphabet in the process.

However, the diagrams shown herewith, indicate about what cooling may be expected from the first-cooling stage of a well-designed air-quenching cooler under average operating conditions. Curves showing final clinker temperatures are largely empirical and are based on results observed in practice. The corresponding preheat values shown in the secondary air volume are calculated directly from the sensible heat drop of the clinker and take no account of any additional source of heat or radiation losses in the heat transfer.

Preheat in the combustion air is of importance in its effect on flame temperature in the kiln, fuel consumption, and the rate of flame propagation. Frequently, however, this beneficial effect is largely nullified through infiltration of cold air at the firing hood, excess air, stratification, cold primary air, and water in the primary air-fuel mixture.

Perhaps the simplest method of avoiding infiltration is to establish a slight pressure in the discharge end of the kiln, resulting in outward rather than inward leakage. Seal-rings will accomplish this purpose if observation ports and other openings in the front face of the hood are covered, but unless the heat exchange takes place internally, a heat-resistant alloy kiln end is necessary to prevent destruction of the kiln shell at this point. The necessity for employing excess air beyond theoretical combustion requirements is largely due to infiltration and resulting stratification in the absence of turbulence in the preheated secondary air volume where it encounters the fuel.

Cold primary air, particularly when it contains an appreciable quantity of water, necessarily slows up the flame rate. Investigators who discuss the rotary kiln from its thermal aspects, at times draw an analogy between the kiln and the internal combustion engine and point to the "superior" performance of the automobile engine on a rainy day. This leads them to the conclusion that water may be of value as a catalyst, thereby aiding combustion in the kiln. However, Ricardo demonstrated conclusively that water or water vapor introduced in any quantity into the combustion chamber has the immediate effect of reducing thermal efficiency and the rate of flame propagation. Gayley had previously shown that the normal humidity of atmospheric air is a decided deterrent to combustion in the blast-furnace.

The presence of high preheat in the combustion air, as mentioned, is of great value in its influence upon flame temperature and ultimate fuel economy in the kiln, since a high flame potential assures the production of more heat at and above the temperature required to form clinker. The failure to recognize this elemental truth is undoubtedly responsible for many of the exaggerated claims made for the air-quenching cooler. Relinquishing the substance for the shadow, observers are inclined to ascribe the total fuel saving to heat reclamation from the clinker and take no account of this other equally important factor.

In dismissing the subject of preheat, I would say that an experience of several years having to do mainly with the air-quenching cooler, and the study of more than forty of these units, coupled with a more or less casual observation of possibly a dozen others, offers nothing in confirmation of the exothermic hypothesis. Such experience is not admissable as evidence. It is simply the record of a negative result.

Requirements for Maximum Performance of Cooler

If we expect to obtain the maximum performance from an air-quenching cooler, the following fundamental requirements are of great importance:

1. The active cooling surface should be condensed into the smallest possible area and located as near the burning zone as conditions will permit. This insures that the initial application of cooling air will be made before the clinker has had the opportunity to chill, and that the beneficial effects of the rapid air quench will reach a maximum.

2. The distance of travel of the preheated air volume to the burning zone should be as short as possible in order to reduce heat losses.

3. The exposed external surface surrounding the cooling surface should be reduced to the lowest possible limit thereby minimizing the loss of heat through radiation.

4. The preheated secondary air volume should contact the primary air-fuel mixture in a highly turbulent condition for reasons already stated.

Taking for example a kiln 10 ft. in diameter with an output of one bbl. per minute, the cooling surface in the recuperator section or first stage of the cooler need not be longer than 6 ft. with an active width of 40 in. In certain cases the length of the surface may be reduced to 5 ft. The employment of an arched construction in the cooling surface gives an increase of about 45 percent in the effective area without increasing the projected area or space occupied.

Breakage and Segregation

(Continued from page 30)

In theory as well as practice, segregation takes place on the job the same as at the quarry. Here, however, the contractor is to blame rather than the producer.

Oftentimes, especially in concrete batching operations, stock piles are deposited on the ground. In some cases considerable segregation of stone takes place because too high a stock pile has been built.

One job in particular was noted where the stock pile was 40 ft. high, and conical in shape, using a graded stone from 2½-in to ¾-in. This was an ideal situation for segregation. It is no wonder that the inspector on the job four miles away noticed a difference in each batch of concrete due to the sizing of the stone. The producer, 50 miles away, was notified of the rejection of the material; whereupon, the producer drove immediately to the unloading point and inspected the barges of stone, which appeared to be correct. The stock pile was then observed. The inspector at the dock who took samples of each barge also acted as weigher on the aggremeter. Apparently he was oblivious to the fact that segregation occurred in stone. A trip was made back to the dock with the job chief-inspector and all was straightened out by better handling of the stock. The result was loss of time to the producer and ill-feeling by the dock inspector towards the producer for unearthing his lack of knowledge.

No tests were run from samples on the job, inasmuch as more extensive and accurate tests could be carried on more easily at the various quarries, where the findings are just as applicable to job stock piling.

(To be continued)

Changing Conditions Call For New Methods

Round table discussions of practical operating problems feature convention sessions of sand and gravel and ready mix concrete operators

CAPACITY ATTENDANCE at meetings of the National Sand and Gravel Association and the National Ready Mixed Concrete Association held in the Jefferson Hotel, St. Louis, January 17 to 19, inclusive, was conclusive evidence that the programs had real "meat" in them. The informal round table discussion type of meeting where the members themselves provide an interchange of experience has become the magnet which has drawn capacity crowds to the sessions. About 500 were estimated to have attended the convention as members, guests, and manufacturers' representatives.

Officers, National Sand and Gravel Association

PAUL P. BIRD, Boston Sand and Gravel Co., Boston, Mass., was elected president of the National Sand and Gravel Association. Otto S. Conrades, St. Louis Material and Supply Co., St. Louis, Mo., was elected vice-president and Harry S. Davison, Pittsburgh, Penn., was re-elected secretary-treasurer.

Elected to serve on the executive committee were George W. Renwick, Chicago, Ill.; J. M. Settle, Louisville, Ky.; Anderson Dana, New York, N. Y.; and Robert Mitchell, Los Angeles, Calif. Directors at large are J. P. E. Price, Scranton, Penn.; F. C. Fuller, Portsmouth, Ohio; Stephen Stepanian, Columbus, Ohio; E. Guy Sutton, Mattoon, Ill.; and Otto Conrades, St. Louis, Mo.

New Officers Ready Mixed Concrete Association

J. H. DIXEY, of Transit Mix Concrete, Inc., New York, N. Y., is the new president of the National Ready Mixed Concrete Association. Other officers are as follows: vice-presidents, H. F. G. Pelsue, Graham Bros., Los Angeles, Calif.; A. J. O'Connor, Koenig Coal & Supply Co., Detroit, Mich.; Stephan Stepanian, Arrow Sand & Gravel Co., Columbus, Ohio; secretary, Don Reynolds, Boston Sand & Gravel Co.; treasurer, Alexander Foster, Jr., Warner Co., Philadelphia, Penn.; member-at-large, board of directors, Alexander Johnson, Central Concrete, Inc., New York, N. Y.

Mr. Dixey, in accepting the office, expressed his appreciation of the honor and asked for the coöperation of the members.

At the joint meeting held on January 17, President J. Rutledge Hill of the sand and gravel association and Jas. F. McCracken of the ready-mixed concrete group were the presiding officers. Carl Brown, chief engineer, State Highway Department of Missouri, welcomed the associations. Prominent speakers included Paul G. Hoffman, president, The Studebaker Corp.; W. C. Markham, of the American Association of State Highway Officials; and Thos. S. Holden, vice-president, F. W. Dodge Corp. Abstracts of these important addresses will follow on other pages in this issue.

Paul P. Bird, new president of the N. S. & G. A.

State Associations' Luncheon

RAY V. WARREN, engineering representative, Pennsylvania Sand & Gravel Association led the discussions on state association activities over which Executive Secretary V. P. Ahearn presided. Mr. Warren said that the requirement of the Pennsylvania State Highway department that all producers test their material to certain standards with the Los Angeles rattler brought about state organization. Another measure which called for this action was the introduction of a bill in the legislature which provided that all highways be constructed with crushed stone. With respect to the use of the Los Angeles rattler test, the association has succeeded in having the order suspended until the producers had a period of time in which to equip their plants.

W. W. DENNIS of the California Rock and Sand Producers Association described the methods his association had followed in meeting the difficult labor problems arising in the San Francisco Bay area. As a result of a regional contract of all producers in this area with the A. F. L. unions, no trouble has been experienced during the three years the contract has been in effect. Details of this contract appeared in ROCK PRODUCTS (December, 1938, p. 48).

BUCK WEAVER of the Illinois Sand

Group of ex-presidents: Left to right, Robt. J. Potts, John Prince, H. V. Owens, V. O. Johnston, R. C. Fletcher, and J. Rutledge Hill, and Executive Secretary Ahearn at the end

Paul Bird, left, telling C. S. Huntington, Link-Belt, how he did it

and Gravel Association told about the activities of his state group.

The presidents of the railroads were petitioned for a hearing with their traffic representatives, basing their plea on the need for reduced rates to meet truck competition and the loss of business to small wayside pit plants. It is expected that some relief may be granted.

CLAUDE L. CLARK of the Ohio Sand and Gravel Association reviewed the experience of his association on the problem of sales tax exemption in Ohio. In 1933 the Ohio Tax Commission ruled that sand and gravel production was to be classified as mining. Recently, however, the commission gave an opinion that it did not come under this classification. The old ruling was brought to the attention of the commission with the result that the industry has received exemption from the sales tax on the basis that it comes under the mining classification.

SAM C. HADDEN of the Indiana Mineral Aggregates Association, covering both crushed stone and sand and gravel producers, told about the work of his group in support of a Tax Payers' League which has been organized to reduce taxes and prevent diversion of highway funds.

Outlook for Business in 1940

PAUL G. HOFFMAN, president of the Studebaker Corp., in an address on "Highway Safety—The New Dynamic," annihilated the current talk of certain statesmen about "our vanished frontiers and the disastrous effect of this phenomenon on our national economy"—that "we are face to face with a static economy with its implied concomitants of chronic unemployment and a lower standard of living."

He saw many human wants yet unsatisfied, new enterprises forthcoming as soon as deterrents to free enterprise are removed, as well as

Paul G. Hoffman

expansion of present industries. He then elaborated on how the aroused sentiment for greater safety on the highways was leading and would lead still farther to the construction of more and better, as well as safer highways. "It is my reasoned conviction," he said, "that the biggest development in highway transport lies still ahead of us. The astronomical 200 billion miles of automotive travel in 1935 will become a fantastic 500 billion miles in 1960, if adequate roads and streets are provided to handle it safely."

Need 25,000 Miles of Superhighways

The "new dynamic factor" which is of such great interest to the sand and gravel industry is the 50 billion dollar job of providing the 25,000 miles of superhighways needed outside the cities and for making a good start toward modernizing street facilities within cities. Mr. Hoffman assured his listeners that there was nothing fantastic about the program from a financial standpoint. He said, given all the breaks, the project might be complete within 20 years. But one requirement is that we must put a stop to the present diversion of highway building funds. If this were done we could finance this huge project from present revenues derived directly and indirectly from motor-driven vehicles.

Much of the necessary preliminary planning for such a highway construction project has already been done. "How soon shall we start?" Mr. Hoffman said we already had started—and he described the Holland Tunnel in New York and other well-known superhighway projects in metropolitan New York. He concluded by urging unanimous support for the highway building program outlined by Thos. H. MacDonald, chief of the U. S. Bureau of Public Roads. This program was described and commented on in ROCK PRODUCTS of several months ago (June 1939, p. 43).

General Building

THOMAS S. HOLDEN, vice-president, F. W. Dodge Corp., said that statistics based on construction contracts let in 1939 in the 37 Eastern States were $3,550,000,000 — three times those of 1933, the lowest of the depression years — the greatest and most consistent increase being evidenced in residential building, which amounted to only $249,000,000 in 1933 and $1,334,000,000 in 1939. Also there is a healthful increase in privately financed building and engineering work. From a statistical angle only, he said a continued recovery on a substantial scale was indicated for 1940.

Mr. Holden then emphasized the difficulties for forecasting construction because of the obvious fact that

W. W. Dennis, secretary of the Rock, Sand & Gravel Association, San Francisco, Calif., addressing the State Associations' Luncheon

we are dealing with a human equation made up of independent, individual judgments of many persons; these judgments being affected by political, economic and personal factors. And he mentioned the spirit of defeatism "which has not yet been fully overcome."

"The one doubtful factor within the construction industry," he said, "the threat of rapidly rising construction costs, is a real one." However, he said he was inclined to believe "the odds are in favor of moderate increases that will not discourage a rising volume of private construction . . . I look for a 10 or 12 percent increase in privately financed construction this year."

As to public works, the menace of war and the present national defense program, Mr. Holden said, so far as he had been able to learn, would result in only a moderate volume of construction, including army airfields, port developments, base hospital improvements, army housing and other buildings at army and navy posts or bases—a large part of this in the Panama Canal Zone, Puerto Rico, Virgin Islands and Hawaii. Any P. W. A. program that may be

Abe Goldberg of Allis-Chalmers, left, and Irving Warner

authorized, he thought, would be mainly for highways. Outside of these there is a large carry-over program of highway construction under the U. S. Bureau of Public Roads in coöperation with the states.

A summary of the F. W. Dodge Corp. forecast for 1940 for the 37 Eastern States is as follows:

Commercial buildings, 17 percent increase over 1939; manufacturing buildings, 37 percent increase; all other types of non-residential buildings (chiefly public and institutional) a decrease of 16 percent; residential building, 4 percent increase in privately financed buildings, 78 percent increase in publicly financed, making a net of 15 percent in all; heavy engineering construction (public works and utilities) a decrease of 15 percent compared with 1939—with about the same amount for construction of highways.

Listening to one of those Texas stories. "Bob" Potts of Waco telling one to Anderson Dana, John Prince, and Paul Bird

These estimates Mr. Holden considered conservative. Discussing the changed conditions since the World War period, he said his figures were not based on expectation of a war boom or war inflation. The estimates assume that the United States will stay out of the war and that war purchases in this country will not greatly affect our domestic economy as they did before.

What Is Ahead for Highways

W. C. MARKHAM, executive secretary, American Association of State Highway Officials, gave a futuristic outlook to highway construction and maintenance based on government incomes for that purpose, in a paper, "What Is Ahead for Highways."

Summing up highway construction to date, Mr. Markham said there is a total of three million miles of open roads, representing 14 percent state, 57 percent county and 28 percent township roads. Of the total, 36.7 percent are high type roads, 22 percent medium classification, 26 percent low type and 15 percent dirt roads. About 11,000 miles of roads are greater width than two lanes.

About 8150 grade crossings were eliminated in recent years by the state highway systems, but there is a need for approximately 28,900 more grade separations to be built.

Mr. Markham said that states had listed 106,000 miles of roads which need rebuilding, at a cost of $3,560,000,000. The immediate need for bridges is an expenditure of $445,000,000, representing construction of 21,682 bridges.

For the last year, the states had an income of about $1,096,000,000, of which 73 percent represented gas and license taxes, 15 percent federal contributions and 5 percent bonds and loans.

Expenditures for that period were 6 percent for the purchase of right-of-ways, 20 percent for maintenance, 13 percent for interest on bonded indebtedness, and 12 percent to local contributions. Mr. Markham called attention to the fact that the percentage outlay for maintenance is growing.

Federal aid has increased from about 0.9 percent in 1928 to 15 percent in 1939, and in 1934 represented 32 percent of the money spent for highway construction. During the 1933-1939 period, income from taxpayers totalled $9,230,000,000, of which $1,900,000,000 was federal and the remainder state income.

Money spent for highways was about 5½ billion from the state income and $1,682,000,000 from the federal revenue. An average of $38,000,000 annually is being spent by the states for purchase of right-of-ways.

Glance at the Future

THE PAST RECORD of production by the sand and gravel industry was used as a basis for predicting future policy by H. HERBERT HUGHES, U. S. Bureau of Mines, in a paper, "The Sand and Gravel Producer Takes a Glance at the Past in Charting His Course for the Future."

Mr. Hughes used slides to show statistics which relate directly to the sand and gravel industry in contrast to the usual year-end summaries which relate to general business con-

A close-up of "Bob" Potts, whose presence helps to make any convention complete

ditions and have little direct bearing on sand and gravel production. For instance, the index of volume of iron and steel production for 11 months of 1939 was 65 percent over 1938. This was used to show that the molding sand output must have recovered from the lean year of 1938. Similarly, statistics on glass production indicated that the glass sand industry had a good year in 1939.

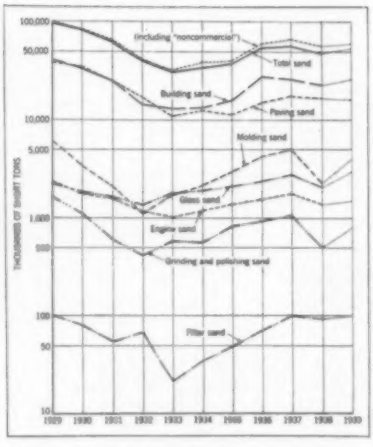
Mr. Hughes was particularly optimistic over the upswing in privately-financed construction, both residential and non-residential, building. The increase in construction was only about 10 percent over 1938 but represents to a large extent the investment of private capital. Engineering construction for 11 months in 1939 was up 12 percent, but concrete paving contracts were 14 percent lower than in 1938.

Building sand and gravel follows closely the trend of construction contract awards, and building gravel was shown to have held a relatively high level in the past 10 years. Another chart confirmed the fact that there is an increasing use of sand and gravel in bituminous paving. The net result of Mr. Hughes' figures on consuming industries showed an increase in demand for sand and gravel for all uses in 1939 of about 10 percent, but no figures were available to determine whether the commercial industry received its full share of the increase.

Rail shipment figures of the Interstate Commerce Commission showed an increase in shipments of sand and gravel of three percent for three-quarters of 1939 as compared to 1938. This was interpreted by Mr. Hughes to indicate a probable increase of 10 percent in total output when the drop in rail shipments to about 31 percent of the total commercial production in 1938 is considered.

Building sand output of commercial plants apparently has recovered to a higher level than paving sand. Other charts showed a tremendous increase in noncommercial production and the collapse of the railroad ballast market. Before 1929 less than 5 percent of the total tonnage of sand and gravel was reported by state highway departments and other similar governmental agencies but by 1931 this tonnage had increased to 16 percent.

By 1938, noncommercial production had increased to 42 percent of the total tonnage, of which 59 percent was produced by various governmental agencies and 41 percent by contractors for various units of government. Of the total of 76,000,000 tons of sand and gravel reported by government and contractor operations in 1938, only 18 percent was washed or screened and the remainder was unprepared and had a reported value of only 23 cents per ton. In contrast to this, only 12 percent of the 108,000,000 tons reported by commercial operations was unprepared.



Trends in sand production during the past ten years

Government and contractor production is concentrated in northern New England, the Middle West, the Rocky Mountain and Pacific States, North Carolina and Alabama. Commercial production predominates in the east and south.

Summarizing his prepared charts, Mr. Hughes said that the demand for sand and gravel during the past 10 years generally had kept pace with consuming industries, a definite trend toward increased use of gravel is apparent, particularly in bituminous mixes, and portable plants in many localities have made serious inroads into markets of established sand and gravel producers.

Presentation of Safety Trophies

EXECUTIVE SECRETARY V. P. AHEARN stressed the importance of safety and the benefits that accrue to both employe and employer. He pointed out that there are more entrants in the safety contest than ever before, indicating a widespread interest in promoting safety.

John Prince, of the Stewart Sand and Material Co., Kansas City, Mo., presented the trophies to the two winners in the large and small producer classifications, mentioning that the contest was conducted by the Bureau of Mines in coöperation with the Association and ROCK PRODUCTS had donated the plaques.

RAY WARREN of Pittsburgh accepted the trophy for the Captain Plant, McCrady-Rodgers Co., Pittsburgh, Penn., winner in the 100,000 man-hour or more classification, and Howard Walsh of Graham Bros. received the award for the Rancho, Calif., plant in the less than 100,000 man-hour classification, having had no lost-time accidents in 1938. Thirty-five plants were awarded certificates of merit, and there were 70 entrants.

Practical Safety Program

L. P. WARNER, JR., Warner Co., Philadelphia, Penn., outlined the safety and employe relations program of his company which has been effective in reducing accidents and improving working conditions, and has brought about a better understanding between employes and company.

All functions concerned with safety, personnel, medical, employes publications and workmen's compensation have been combined under the guidance of the Industrial Relations Department. The company is self-insured for workmen's compensation, and accordingly has set up its own system of physical examinations, medical procedure, accident reporting and cost analysis forms. The total cost of this system, including workmen's compensation, amounted to one percent of the payroll in 1938, and

Bruce G. Shotton, Hendrick Mfg. Co., new director, representing manufacturers

for six months of 1939 amounted to 0.9 percent of the payroll. Monthly safety meetings are held at most locations to discuss hazardous conditions and recommend methods for their elimination. A safety committee functions in each department. Physical examinations are required when an employe is hired and later periodical checks are made in reexaminations. A very complete employes qualification record card is kept.

An interesting safety bonus system for truck drivers has been very effective in holding down accidents. At the end of the calendar year every driver having four credits, representing no accidents over a continuous period of 12 months, receives a sum of money equivalent to an average week's wages computed on the average annual earnings of all drivers employed at the particular terminal to which he is assigned. Some interesting slides were displayed by Mr. Warner, showing graphs indicating improvements in the safety record of his company and views of locations and equipment which had been safeguarded against accidents. The discussion which followed brought out the information that the Warner self-insured system cost one-fifth the state rate. Mr. Prince reported that some difficulty was experienced in having the men agree to periodical reexamination. Mr. Ahearn said that safety work paid dividends as a cold-blooded business proposition.

Engineering Division

STANTON WALKER, director of engineering, National Sand and Gravel Association, presented an interesting report of the engineering and research activities of the association. He referred to the additional equipment of the laboratory which has greatly facilitated the work of the Research Foundation at the University of Maryland. These studies embrace: adhesion of bitumen to aggregates; physical characteristics of aggregates; abrasion tests of aggregates; soundness studies; sands in mortar; modulus of elasticity determinations; and many special investigations for the industry and individual members. His department also completed the compilation of data used in preparing the seasonal exemption report which resulted in the granting of an exemption for companies operating in certain areas from provisions under the Fair Labor Standards Act.

As most of the studies referred to have been presented to the industry in technical information bulletins distributed by the association, detailed mention will not be included.

Status of Sand and Gravel Industry

V. P. AHEARN, executive secretary, National Sand and Gravel Association, summarizing the results of an industry-wide questionnaire, said in part:

"The first question was: 'How did the volume of business in your area in 1939 compare with 1938.' It appears that the volume of sand and gravel business in 1939 represented approximately an increase of 15 percent over 1938; there was probably an increase of about 20 percent in ready-mixed concrete volume. There are exceptions to this national figure. There were declines in southern California, in the New York City area, in Iowa, Michigan and in Florida, and volume in 1939 held its own with 1938 in northern California, northeastern Pennsylvania, northern Missouri, and Texas. The largest increases in volume were experienced in Tennessee, New England, eastern Pennsylvania, western Pennsylvania, District of Columbia, Oklahoma, Illinois, northern Indiana, Colorado and Minnesota; increases of smaller proportions were registered in Ohio, central and eastern Indiana, Utah, Kentucky, southern Missouri and in New York State. In some of these areas general construction had been badly deferred, notably in New England, eastern Pennsylvania and Oklahoma.

"The second question was: 'What is the prospective volume of business in your area in 1940?' Here it is extremely difficult, because of the uncertainties with reference to Federal public works expenditures, to make any intelligent assumptions. I would say, however, that on the whole we should probably prepare for a decline in sand and gravel business in 1940, but that the ready mixed concrete industry may be able to hold its own. Of course there are localities which do not harmonize with the national expectation of a decline. Oklahoma can look forward to an even better year in 1940 than it had in 1939; Colorado should continue to register an improvement; eastern Pennsylvania, where depression has been the rule for so many years, should show an increase of about 15 percent this year as compared with 1939; there should be increases in southern California and in northeastern Pennsylvania; and Michigan, particularly in the Detroit area, should have a fine construction season with active sand and gravel and ready-mixed concrete demand; there should be increases in Illinois and northern Indiana and probably a slight increase in other sections of Indiana; and Ohio should show an increase of about 10 percent. Other sections expect to maintain their 1939 volumes if there are no untoward developments. This is the case in the District of Columbia, Kentucky, New England, southern Missouri, New York State, northern California, the Southeastern states, northern Missouri and Texas; still other areas are prepared for a decline in business this year, which seems to be the case in Utah, in western Pennsylvania, Minnesota, Tennessee, New York City and Iowa.

"The third question was: 'How did the price level in 1939 compare with the price level in 1938? What is the outlook as to prices in 1940?' It must be concluded that prices in 1939 were even lower than they were in 1938, as a national situation. Here and there are exceptions to that condition, but on the whole, a district has done well if the 1938 price level was maintained in 1939, even though last year there were additional increases in costs of operations due to Federal and State statutes imposing new obligations upon employers.

"The fourth question was: 'In general, what relation did volume of demand bear to capacity in your area during 1939?' If a national figure were given on this question, I would say that the returns indicated that in 1939 demand for sand and gravel and ready-mixed concrete represented not more than 50 percent of capacity, although that figure for the sand and gravel industry alone would be much higher.

"The fifth question was: 'What type of projects produced the greatest demand in your area in 1939?' I made the observation, in submitting this report last year, that while highways and streets continued to form the backbone of our largest demand, there has been surprisingly good increases in the demand for large industrial structures and for housing construction. That trend was even more pronounced in 1939, but there are indications that it may be reversed again 1940. For 1939, however, some sections reported very little dependence on highways and streets last year.

"The sixth question was: 'What was the division between public works of all kinds and privately fi-

nanced projects in your area in 1939?' Again I must report the striking unanimity in the replies which I received to this question from all sections of the United States. If I dealt in national figures, I should say that about 85 percent of the sand and gravel and ready-mixed concrete market in 1939 was made possible by public expenditures.

"The seventh question was: 'What type of projects will probably produce greatest demand in your area in 1940? What will be probable division between public works of all kinds and privately financed projects?' It seems clear that highways and streets will strengthen their position this year as offering the largest markets for our two industries. The probabilities are that public expenditures will be responsible for about 75 percent of our total market, with a larger responsibility for private financing, thus producing a better situation than that which existed in 1939.

"The eighth question was: 'To what extent did the public works program in your area in 1939 depend upon emergency Federal appropriations such as WPA and PWA? What is the prospect for expenditure of Federal emergency appropriations in your area in 1940?' It is at once evident that Federal appropriations were responsible to a controlling degree for the public works program in 1939, and the same situation will probably prevail in 1940.

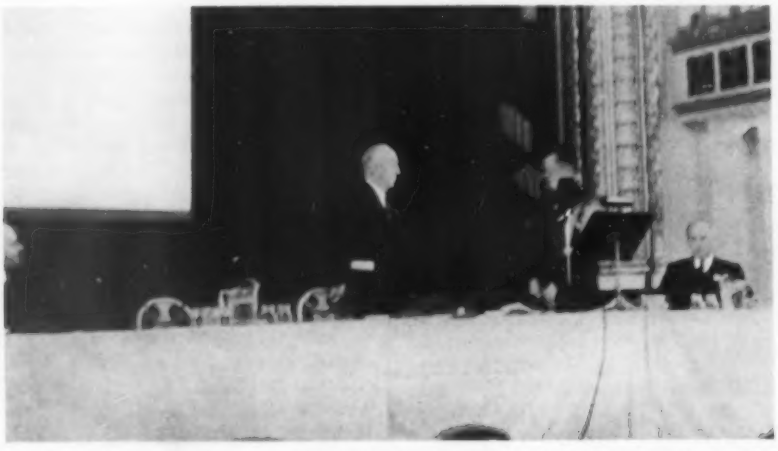
"The ninth question was: 'To what extent did the public works program in your area in 1939 depend upon projects financed exclusively by divisions of Government (States, Counties, and Cities)? What is the prospect for expenditure of public works funds by divisions of Government in your area in 1940?' Divisions of government played only a minor role in creating a sand and gravel and ready-mixed concrete market in 1939 and on a national scale, that situation will not change in 1940. For the country as a whole, I believe that divisions of government accounted for only about 15 percent of the public works program last year, but they will do better this year in some areas, including Indiana, eastern Pennsylvania, Tennessee, New York State and southern California.

"The tenth question was: 'Did privately financed construction in your area increase or decrease in 1939 compared with 1938? What is the prospect for privately financed construction in your area in 1940?' While it is difficult to place one's finger upon the majority sentiment growing out of the answers to this question, I believe it is a fair conclusion to report that privately financed construction increased substantially in many areas in 1939 as compared with 1938, and that in these same areas the prospect is that privately financed construction will assume an even more important position in 1940.

"The eleventh question was: 'To what extent did the private aggregate industry in your area have to contend with plants owned and operated by divisions of Government, either with or without WPA funds? If such competition was encountered in past, did new WPA law effect any relief from problem in 1939?' This is a very serious problem or no problem at all according to the area from which a report is received. Government competition with the private aggregate industry is practically unknown in western Pennsylvania, District of Columbia, Michigan, Texas, Kentucky, eastern Pennsylvania, southwestern Illinois, Ohio, southern California, Florida, northeastern Pennsylvania, New York State, the New England States and northern California; but it starts to become a problem in Indiana, and assumes the proportions of a tremendous problem in northern Missouri, in Colorado, in Minnesota, Utah, Tennessee and Oklahoma. There were many crushed stone plants built and operated by WPA funds which have created a serious problem for the sand and gravel industry, and with the exception of Minnesota, all reports are that the new WPA law did not effect any relief on this question of subsidized competition. Minnesota reported that governmental competition was slightly less than in 1938, due to two things: fewer WPA projects and the prohibition against solicitation by public officials of sales for materials produced in WPA plants.

"The twelfth question was: 'What would be effect on building volume in your area if there should be substantial curtailment of Federal expenditures? Will State or States in your area match Federal funds under Federal-aid Highway Act? Has there been serious diversion of highway funds?' From the standpoint of our two industries in a national sense, the answer to this question must be that a substantial curtailment of Federal public work expenditures would have a drastic effect on our volume in 1940. That is clear from answers to the questions to which I have referred previously. A different report, however, is made for Michigan, Texas, and for northeastern Pennsylvania, where there is less dependence upon strictly Federal expenditures, but even in those areas the Federal-aid highway program occupies a role of first importance. Large diversions are reported, particularly in New York where there is an annual diversion of about $65,000,000 of highway funds. The diversion in Illinois last year approximated that of 1938, which totalled about $6,700,000.00. Some States may find themselves unable to match Federal-aid funds, including Georgia, Missouri and Kansas.

"For a summary of this summary, I would say just about this: we had a 15 percent increase in business in 1939 as compared with 1938; but we shall have trouble holding to this volume in 1940 and some decrease may be expected. The price level on the whole was down; demand represented about 40 percent of capacity.



Paul P. Bird, the new president of the National Sand and Gravel Association, taking over the gavel from the retiring president, J. Rutledge Hill

Forum on Operating Problems

PLANT OPERATION as it is affected by trends in specifications was discussed by producers of sand and gravel in an open forum on operating problems. To open the discussion, STANTON WALKER, director of engineering of the National Sand and Gravel Association reviewed some of the conditions which now must be met in sand and gravel plants and compared them to operations of a few years back. He called attention to the definite trend toward closer tolerances in sizing of aggregates, which got its start with the state highway department engineers, and how production methods must be revamped to meet them. He also mentioned the difficulties in plant operation resulting from demands in some states for, say, three sizes of coarse aggregates within the range of ¼- to 2-in.

Other developments mentioned by Mr. Walker were the demands for higher proportions of fines in sand, up to 10 to 20 percent minus 50-mesh and a minimum of three or four percent through 100-mesh, and the tendency of purchasers to pay more and more attention to mineral quality.

Discussion following Mr. Walker's introduction developed that about seven state highway departments had specifications for two or more sizes of coarse aggregates, that the state of New Jersey has been considering three sizes and the state of Pennsylvania will have three sizes in 1940 and 1941.

Soft Stone Elimination

In discussing soft stone and its elimination, Stanton Walker remarked that some river gravels when dried and reimmersed in water would only recover about 80 percent of the moisture they originally contained after a period of time up to five months. With this factual data as a basis, it was his opinion that some questionable cherts when dried out would be satisfactory aggregate. He suggested that stockpiling in protected stockpiles might be of help to some plant operators.

RAY V. WARREN, engineering representative, Western Pennsylvania Sand and Gravel Association, told how producers in his area had studied the problem of soft stone, and had adopted a policy of selection of aggregates as a solution to the problem. In his part of the country, soft material found in river deposits occurs as broken down sand stone. Contrary to the apparently logical assumption that the larger stones up to 8- or 10-in. diameters would be the hardest material, it was found that sizes under 4½ or 5 in. are the more desirable. The larger material had evidently been of local origin and not subjected to the wear and abrasion of the smaller gravel. Consequently, producers generally reject everything over 5 in. in size. The state of Pennsylvania uses the Los Angeles rattler

Otto Conrades, newly elected vice-president, N. S. & G. A.

test for soundness and allows a maximum loss of 35 percent. Mr. Warren mentioned that some added allowance in permissible loss on the Los Angeles test was granted to producers on the basis of the percentage of crushed gravel produced. For an extra percentage of 10 percent in crushed particles, an added percent is added to the permissible loss.

Mr. Warren said that if the soft particles are put into the sand, scaling will occur in the concrete and an excessive loss will show up when subjected to the sodium sulphate soundness test. Loss of this material runs as high as 14 percent in 5 cycles as compared to three percent for the natural sand.

Mr. Warren stressed how engineers are constantly increasing standards for quality every year. On the Pennsylvania Turnpike, the famous superhighway now under construction, the allowable sodium sulphate loss is 8 percent, and the figure is now 10 percent for state highway construction.

E. J. NUNAN, Buffalo Slag Co., Buffalo, N. Y., said that in his area the allowable loss on sodium sulphate had been increased from 8 to 10 percent, but that the number of cycles had been increased to the extent that the standard is actually more rigid. The allowable loss for gravel is 12 percent at 10 cycles. In producing sand he said that losses in sand ran up to 10 or 12 percent at 5 cycles due to existence of shale in the material. This loss was reduced to 6 percent in one of his concern's plants by use of a commercial eliminator but too much good material was broken down and the process was given up.

Sizing

IRVING WARNER, Warner Co., Philadelphia, Penn., discussed the practical application of producing coarse aggregates according to Simplified Practice Recommendation R 163-39, a recommended standardization for aggregate sizes sponsored by the U. S. Bureau of Standards. This specification has been adopted by 8 or 10 states and is under consideration by various consumer groups.

Mr. Warner said that the principle behind the simplified standards was sound but he pointed out that plant operators find out for themselves if production to the specification is feasible in plant operation. His discussion was illustrated by plant grading charts which were developed as a guide to tell when changes were necessary in the plant setup. In Mr. Warner's opinion, operators of plants do not know what they are up against in producing to this specification unless they have tried it. Among the things he observed were the necessity for screening twice and throwing away the middlings and the necessity of keeping the plant loaded. A properly loaded plant produced a more consistent product than one lightly loaded, due evidently to "grass-hoppering" of gravel over the screens without load.

Mr. Warner asked B. V. Hedrick, B. V. Hedrick Gravel and Sand Co., Lilesville, N. C., to comment on his experience in producing to the simplified specification. Mr. Hedrick has found it possible to produce but not without difficulty. His plant is better equipped than many to produce to the specification due to the fact that the total screening surface is large compared to other plants of similar capacities. At this plant, seven sizes of coarse aggregates are produced and blended from bins onto a common belt conveyor. Segregation is the diffi-

Otto S. Conrades, newly elected vice-president of the National Sand and Gravel Association, addressing the convention

cult problem, said Mr. Hedrick, since segregation in loading cars will result in bad samples even if the blended gravels filled the specifications perfectly. Mr. Hedrick uses a 6-ft. vibrating screen for a spreader in loading cars.

In discussing the production of sand, Ray V. Warren, Pittsburgh, Penn., said there is a definite movement to require sand to be shipped in two sizes split at about 30-mesh.

Producing Crushed Gravel

J. R. THOENEN, U. S. Bureau of Mines, told of studies being conducted by the Bureau of Mines in regard to the production of cubical particles without increasing the amount of fines made. Crushed stone is now being studied but gravel will also be considered. Part of this study is concerned with the use of screen cloth with rectangular openings to screen out slabby pieces of material which will then be re-crushed. These studies have revealed that as the ratio of reduction approaches 1:1 the percentage of cubically-shaped particles increases under all conditions. These studies are of extreme importance since particle shapes are emphasized particularly where the gravel is used for bituminous surfaces, in railroad ballast, etc. Mr. Thoenen also called attention to a study being made of the comparative efficiency of truck versus locomotive haulage in quarries, which are revealing important losses in efficiency which add to costs of production. These studies thus far have been confined to 21 plants but will be continued by the Bureau of Mines to cover more plants.

RAY V. WARREN, engineering representative, Western Pennsylvania Sand and Gravel Association, told how producers of aggregates in that part of Pennsylvania are making a study of previous jobs in which sand and gravel aggregates were used to further the use of these materials in future work, in a paper "Promoting Use by Service Records."

The reason for the study now under way is that concrete, and aggregates, in western Pennsylvania have been put on the defensive, said Mr. Warren, and producers found it necessary to defend themselves on a technical basis. Four producers have engaged two impartial engineers of national reputation to make this study.

Railroad Ballast

Specifications for railroad ballast have changed in recent years and have materially affected methods of production. The tendency is for smaller top sizes in order to get more crushed particles and improved alignment in roadbed grades to better meet today's demands for more speed and comfort.

MR. MILLER, maintenance of way engineer, Missouri Pacific Railroad, was called upon in an open forum meeting for his views as a purchaser of railroad ballast. He reviewed the progress made in rail transportation over a period of years and said that the demands for higher speeds and appearance of the railroad lines today are logically responsible for changing demands in ballast. Washed material is specified now in preference to pit run ballast to wash out matter which supports plant growth, and finer ballast is desired in maintaining smoother surfaces. Raises are now in terms of fractions of inches as contrasted to raises of more than a foot years ago.

GEORGE RENWICK, Chicago Gravel Co., Chicago, Ill., said that the top size for ballast had been reduced from a maximum of two inches in 1911 to all passing a 1-in. square opening today. The percentage of crushed particles increased from about 55 percent in 1911 to 85 percent in producing 1-in. minus material. According to Mr. Renwick, these changes have meant the installation of added equipment to plants in his producing area.

CLARENCE STUMPF, McGrath Sand and Gravel Co., Lincoln, Ill., said that ballast as produced at his company's plants had limits between ¼- and 1½-in., with 35 percent crushed particles and very little sand contained.

J. H. EVANS, The Sturm and Dillard Co., Columbus, Ohio, said that specifications for ballast filled by his company have a top size of 1¼- to 1½-in. Originally 20 percent sand was specified but sand no longer is desired. The specification calls for 10 to 30 percent between ¼-in. and 10-mesh. About 20 percent of the total must be crushed and that in the lower size brackets to facilitate drainage.

STANTON WALKER added that, where sand is still permitted in ballast specifications, it is a coarse sand around 16-mesh which will drain satisfactorily.

Stabilized Road Mixes

In a discussion of stabilized road mixes, it was emphasized that this market for sand and gravel was being overlooked by far too many operators of commercial plants as belonging to the operator of portable plants.

F. V. REAGEL, engineer, Missouri State Highway Department, spoke quite optimistically of the future of these mixes for road maintenance and for building shoulders. The tendency is for plant mixes near the larger cities and for road mixes in outlying sections. A Memphis, Tenn., permanent plant operator said that stabilized road mixes were the principal outlet for sand and gravel from his plants and that his concern was planning to use portable plants to get more of this type of business.

An interesting point brought out was that limestone dust is just as effective a binder as clay for some types of stabilized road mixes.

Use of Gravel in Concrete and Bituminous Mixtures

W. H. WOOD, engineer of materials and tests, Texas State Highway Department, told about some of the practices in selection and grading of aggregates in Texas.

Crushed and uncrushed gravel are used generally over the state, and crushed gravel has been used for cutback asphalt mixes made at the plants. Production of crushed gravel is not large. Therefore when a demand for more paving material of

the cut-back type was specified, a study was made to develop a cold mix maintenance material using uncrushed gravel and a special specification was adopted by the state.

In 1938 the Duval test was dropped in favor of the Los Angeles rattler test for soundness of aggregates. After 10 years of research into the durability of aggregates when subjected to freezing and thawing tests, it was concluded that these tests did not correlate with similar tests on the concrete made from these aggregates. It was concluded that an aggregate with high resistance to freezing and thawing might result in a concrete of low resistance and the reverse, depending on the particle shapes and surface characteristics of the aggregate. Limestone was found to produce more durable concrete than well rounded siliceous gravel but not when tested as aggregates, for example.

It was also found that choice of aggregates might discount the water-cement ratio in concrete as a positive measure of strength and durability. A case was mentioned where the aggregates were varied and the concretes produced changed in compressive strength from 3000 p.s.i. to 5700 p.s.i. Limestone dust added to a mix was found to be of value in improving workability in concrete without being detrimental to its durability.

The Texas highway department has used open grading for aggregates since 1933 and, according to Mr. Wood, the policy of setting only top and bottom limits has worked out satisfactorily. The trend is toward specifying concrete design on some form of performance specification but without setting any definite quantitative standards of a cement content.

Industry and Goverment

THE ENCROACHMENT of the Federal Government on private enterprise was the subject of much thought, both on the convention program and in private. It creeps into discussion on almost any subject. No one expects that Federal Government will ever retire from this field. All that is hoped for is more intelligence on the part of statesmen in legislating on matters which vitally affect business and industry.

V. P. AHEARN, executive secretary, National Sand and Gravel Association, gave a summing up of Federal Activities which won universal praise for its completeness and penetration. Some extracts follow:

The Federal Wage and Hour Law

"If the Federal Government can constitutionally legislate the 40-hour week and 40-cent minimum, it can also legislate a 30-hour week and a 60-cent minimum.

"Protection of sweatshop workers was the original purpose of the statute, but compulsory distribution of work and pegging of wages at minimums were later grafted on.

"The employers then face the prospect that Congress may upset the whole national economy each session by raising wages and lowering hours of employees, or by lowering wages and raising hours of employment. It is thus difficult for business to plan ahead and make future commitments.

"The unions have the acute problem of what to do about present trends in governmental policies. That trend, carried to logical conclusion, will result in eventual displacement of unions by government.

"This act is geared to the nature of the work of the employee and not to the scope of the market of the employer. Therefore, an employee is covered by the statute only *when he is engaged in interstate commerce or in the production of goods which later move in interstate commerce.* However, the Wage and Hour Division has ruled that there cannot be any separation in a given work-week. In other words, if an employee in one work-week produces goods which move in interstate commerce, his time for that whole work-week is covered. Otherwise the separation can be made.

"Now the question is whether this Wage and Hour law will be amended at the present session of Congress. I don't believe it will be in substance, although there is a general agreement that eventually all employees making $200 or $300 a month or more will be exempted, regardless of the nature of their work.

Walsh-Healey Act

"The minimum wage determination for the ready mixed concrete and sand and gravel industries is still pending.

"In the meantime, the ability of the Department to proceed in that field has been severely handicapped by a decision in the United States Court of Appeals for the District of Columbia holding that the iron and steel wage determination was defective because the Department of Labor gave an unwarranted meaning to the word 'locality' in the statute. The word 'locality,' said the Department in that decision, might be expanded to embrace eight to ten states, and the court said no, that the word 'locality' suggested a confined and limited geographical area.

Unless the Supreme Court of the United States reverses the decision of the Court of Appeals, there will be no minimum wage findings, in my opinion, for the sand and gravel and ready mixed concrete industries.

"The Walsh-Healey Act has had a very profound effect already, that is, the employment provisions. Since the effective date of the statute on September 28, 1936, to January 6, 1940, there have been 144 ready mixed concrete contracts executed subject to the act, valued at $4,521,286.43; 227 sand and gravel contracts, valued at $8,815,729; 27 riprap contracts, valued at $1,077,996; 55 slag con-

Group of ex-presidents in a huddle with "Andy" Dana

M. B. Garber, Thew Shovel, and Hal. Owens, Eastern Rock Products Co., looking them over

tracts, valued at $1,815,319; and 381 crushed and broken stone contracts, valued at $8,192,788.

The National Labor Relations Act

"Here is a bad law, which has had bad administration at the hands of a bad personnel. It is no secret that the law, when passed, was designed to put the Supreme Court on the spot, and few members of Congress thought it was constitutional. They depended upon the courts to invalidate it, thus leaving the legislative and administrative departments of the government free to claim that a noble law was destroyed by judicial invalidation.

"But, much to the surprise of all concerned, the Supreme Court upheld the statute, and now this statute is something like a skunk at a tea party—it smells to high heaven but the government would like to have everybody ignore the presence of the odorous animal.

* * * * *

"Employers have sought important changes in this statute. They want coercion from any source forbidden; they want the closed shop and the check-off definitely prohibited; they want freedom of speech clearly safeguarded; they want a definite statute of limitations; they want the Labor Board itself required to follow the ordinary rules of evidence.

"Industry wants labor organizations to keep on file with the Board, subject to public inspection, reasonable information with respect to themselves and their responsibility.

"*Investigation of building material prices by the Temporary National Economic Committee:* The attack is concentrated on home building because of its popular appeal. The committee has started from a conclusion, and the evidence is designed to support that conclusion, that monopolistic practices have caused homes to be placed beyond reach of the average citizen, and that the result is a curtailment of employment."

Labor Relations

ANYONE who has followed the discussions of labor relations at these annual conventions of the National Sand and Gravel Association must have been impressed first, with the wisdom of the association officers in holding them, and second, with the splendid progress that has been made in this industry toward a better understanding, not merely of problems but of how these are being met and solved.

These sessions are of a confidential character—they are largely experience recitals of individual producers—and it would not be feasible to report them in detail. But any producer who misses them is losing a great deal of necessary education.

The method adopted by the Rock Sand and Gravel Producers' Association of Northern California of making agreements as a unit with seven A. F. of L. unions, in a single contract (described in ROCK PRODUCTS, December, 1938) seemed to be a subject of great interest. At least one other district association now makes contracts along somewhat similar lines, although in this case the members of the association sign as individual firms and not through the association's officers. We shall have more about this in a later issue.

Another striking instance of the progress made in a better understanding of the labor union angle was the statement by a man who has made it his business to understand the union point of view. He said that in no single instance had a labor union failed to live up to its contract; that it was a small producer now and then who might be accused of chiseling.

Some producers are faced with a serious problem in the demands of unions for full seniority rights for their members. How to solve the problem of employes too old to do safely the kind of work they always have done, without reducing their pay to fit work they are now suited for, seems to be a problem that can be satisfactorily solved in some instances only through coöperation of union officials. No employer any longer contemplates firing a man merely because he is old or because he is incapacitated from doing the work he is accustomed to. They try to find some kind of a job for him.

Hayden Brooks and his never-failing smile

That there are problems galore is all too obvious. Labor has still to be educated to simple economic truths that pay rates can not be raised indefinitely without the producer raising prices for his products. And with the government attempting to freeze and even reduce prices it will be just as tough for the working man as for the employer, if union demands do not take these things into consideration. Labor must be shown that shorter hours and wage increases along with price increases do not lead to a better standard of living; wages increased and hours shortened provide a better living standard only if and when more and better products can be made without increasing prices.

Apparently few if any producers now object to collective bargaining, although naturally they prefer to deal with their own employes rather than business agents, except in the case of producers in large metropolitan centers, where such a course may not be practicable. Very few producers want, or would tolerate, the check-off system of paying union dues, not so much on their own account as because they firmly believe it is a rank injustice to their employes and contrary to the democratic nature of our American institutions. That is the real difference between a closed shop and the check-off—a difference in principle if not in results.

There was considerable discussion of the necessity of periodical physical examinations of employes and the difficulties often met with because of the opposition of employes. This has been overcome in some instances by selling the idea to the employe's families; sometimes such examinations are given to all members of the family, and the wives are made fully aware of the benefits. Also a liberal attitude in helping employes to get needed medical advice and services to correct physical defects and ailments is very helpful in overcoming the prejudices against physical examinations.

Seasonal Exemption

AN OFFICIAL RELEASE of the United States Department of Labor, Wage and Hour Division, dated January 16, announced the finding and determination of the Department that the sand and gravel industry in a large part of the United State is entitled to certain exemptions in the application of the so-called Wage and Hour Law (The Fair Labor Standards Law of 1938). The announcement was received in time to be read at the annual convention of the National Sand and Gravel Association at St. Louis, Mo., January 17 to 19.

Secretary Ahearn gave full credit to Stanton Walker, director of engineering of the Association, for the preparation of the data on which the decision was based. Everyone familiar with the presentation prepared by Mr. Walker can have no other opinion than that it was done with thoroughness and accuracy.

The official statement of the Department of Labor reads in part:

The dredging and excavating of sand (but not industrial sand)[1] and gravel from surface or open-cuts were defined in the notice of hearing to mean the extraction of such sand and gravel from pit, bank or marine deposit by hand or power methods including the necessary milling activities incident thereto but not embracing any underground operations.

The National Sand and Gravel Association appeared in support of the application on behalf of all commercial sand and gravel producers in the United States. Its own membership produces 65 percent of the total. Much of the evidence presented by the Association was obtained from questionnaires circulated to all commercial sand and gravel companies.

DETERMINATION

On the whole record I find and determine that:

1. There is a branch of the sand and gravel industry (as defined herein) wherein the plants normally shut down for about six months each year, except for an insubstantial amount of production that may be produced shortly before or shortly after the main production season. This branch is located in the colder and, in general, more northerly parts of the United States; and

2. There is a southern branch of the industry wherein the plants do not shut down at all or do not normally shut down for a substantial period each year; and

3. The plants in the northern branch cease operation annually at a regularly recurring season of the year, except for sales, maintenance, and similar work, because the materials used by the industry are not available for excavation, handling and processing in the form in which they must be excavated, handled, and processed, i.e., as unfrozen sand and gravel, because of climatic factors; and

4. The northern branch of the sand and gravel industry is an industry of a seasonal nature within the meaning of Section 7(b)(3) of the Act and Part 526 of Regulations issued thereunder; and

5. The southern branch of the sand and gravel industry is not an industry of a seasonal nature within the meaning of the Act and the Regulations; and

6. For the purpose of this Determination the sand and gravel industry shall mean the excavation of sand and gravel, but not industrial sand, from open cuts, including necessary milling operations incident thereto; and

7. For the purpose of this Determination the northern branch of the sand and gravel industry shall include all plants located in counties that lie within the isothermic belt below 25 degrees Fahrenheit or are touched by the 25 degree isotherm on Fig. 5 of the American Atlas of Agriculture issued by the United States Department of Agriculture. The said counties are listed in Appendix A attached hereto and incorporated herewith by reference.

8. This determination shall be without prejudice to a supplementary determination enlarging the scope of the Northern branch by the inclusion therein of such plants or groups of plants, if any, as operate in the same manner and for the same reason as the plants in the Northern branch described in paragraphs 1 and 3 above.

WHEREAS, said Findings and Determination were duly filed with the Administrator on January 8, 1940, and are now on file in Room 5144, Department of Labor Building, Washington, D. C., and available for examination by all interested parties:

(Signed) Harold Stein
Presiding Officer

Appendix A

A. All counties in the States of: Iowa, Maine, Minnesota, Montana, New Hampshire, North Dakota, South Dakota, Utah, Vermont, Wisconsin, and Wyoming.

B. All the counties in the State of Colorado except the counties of: Adams, Arapahoe, Baca, Bent, Cheyenne, Crowley, Denver, Douglas, Elbert, Kiowa, Kit Carson, Lincoln, Logan, Morgan, Otero, Phillips, Prowers, Pueblo, Sedgwick, Washington, Weld, and Yuma.

All the counties in the State of Connecticut except the counties of: Middlesex, New London, Tolland, and Windham.

All the counties in the State of Idaho except the counties of: Ada, Benewah, Canyon, Gooding, Jerome, Latah, Lewis, Lincoln, Minidoka, Nez Perce, Owyhoe, Payette, and Twin Falls.

All the counties in the State of Michigan except the counties of Berrian and Monroe.

All the counties in the State of Nebraska except the counties of: Adams, Banner, Buffalo, Chase, Cheyenne, Clay, Dawson, Deuel, Dundy, Franklin, Frontier, Furnas, Gosper, Hall, Harlan, Hayes, Hitchcock, Jefferson, Kearney, Kimball, Nuckolls, Pawnee, Perkins, Phelps, Redwillow, Richardson, Thayer, and Webster.

All the counties in the State of New York except the counties of: Genesee, Monroe, Nassau, Niagara, Orleans, Seneca, Suffolk, Wayne, Westchester and all the counties of the City of New York.

C. The following counties in the following states: *State of Illinois:* Boone, Bureau, Carroll, Cook, DeKalb, DuPage, Henderson, Henry, Jo Daviess, Kane, Kendall, Knox, Lake, La Salle, Lee, McHenry, Marshall, Mercer, Ogle, Peoria, Putnam, Rock Island, Stark, Stephenson, Warren, Whiteside, Will, and Winnebago.

State of Indiana: Allen, DeKalb, Elkhart, Kosciusko, Lagrange, Marshall, Noble, Saint Joseph, Steuben, and Whitley.

State of Massachusetts: Berkshire, Franklin, Hampden, Hampshire, Middlesex, and Worcester.

State of Missouri: Atchison, Gentry, Harrison, Holt, Mercer, Nodaway, Putnam, Schuyler, Scotland, Sullivan, and Worth.

State of Nevada: Elko, Eureka, and White Pine.

State of New Mexico: Colfax, Nora, Rio Arriba, Santa Fe and Taos.

State of Ohio: Williams.

State of Oregon: Baker, Clackamas, Deschutes, Grant, Hood River, Jefferson, Lane, Linn, Marion, Umatilla, Union, and Wasco.

State of Pennsylvania: Bradford, Erie, Lackawanna, McKean, Pike, Potter, Susquehanna, Tioga, Warren, Wayne and Wyoming.

State of Washington: Chelan, Ferry, King, Kittitas, Lewis, Okanogan, Pend Oreille, Pierce, Skagit, Skamania, Snohomish, Spokane, Stevens, Whatoom, and Yakima.

Stanton Walker in the research laboratory at the University of Maryland

[1] "Industrial sand" on which testimony was taken at the hearing but which is not considered in this Determination includes glass, moulding, grinding and polishing, fire, furnace and engine sand.

Viewing the Exhibits

1. Frog Switch & Mfg. Co.
2. Kennedy-Van Saun Mfg. & Eng. Corp.
3. The W. S. Tyler Co.
4. Simplicity Engineering Co.
5. Hardinge Co.
6. International Harvester Co.
7. Jaeger Machine Co.
8. Cross Engineering Co.
9. Bucyrus-Erie Co.
10. Chain Belt Co.
11. Traylor Engineering & Mfg. Co.
12. Atlas Powder Co.
13. Westinghouse Electric & Mfg. Co.
14. Brooks Equipment & Mfg. Co., left and Pettibone-Mulliken Corp., right
15. The Northern Blower Co.
16. A. Leschen & Sons Rope Co., left; Pettibone-Mulliken Corp., center; and John A. Roeblings Sons Co., right
17. Taylor-Wharton Iron & Steel Co.
18. Lima Locomotive Works, Inc., left and McLanahan & Stone Corp., right
19. Brooks-Taylor Co.
20. Eagle Iron Works
21. The Marion Steam Shovel Co.

Viewing the Exhibits

22. E. I. du Pont de Nemours & Co.
23. The Ludlow-Saylor Wire Co.
24. Butler Bin Co.
25. Deister Machine Co.
26. Hercules Powder Co.
27. Conserco, Inc., left, and American Manganese Steel Division of the American Brake Shoe & Foundry Co., right
28. The Buda Company
29. The National Supply Co., left and Illinois Powder Mfg. Co., right
30. Screen Equipment Co., Inc.
31. Williams Patent Crusher & Pulverizer Co.
32. The T. L. Smith Co.
33. Easton Car & Construction Co.
34. The Thew Shovel Co.
35. Broderick & Bascom Rope Co.
36. General Electric Co.
37. Ransome Concrete Machinery Co.
38. American Cynamid & Chemical Corp.
39. Hendrick Manufacturing Co., left and Link-Belt Co., right
40. Blaw-Knox Co.
41. Allis-Chalmers Mfg. Co.

Ready Mix Producers Discuss Better Business and Operating Practices

J. H. Dixey, New York, new president, N.R.M.C.A.

H. F. THOMSON presided as chairman at the first general session of the National Ready Mixed Concrete Association on Wednesday, January 17. The room was filled with a good crowd of interested members and guests. Mr. Thomson reported the formation of a Mixer Manufacturers' Bureau and the approval of a single buying specification for equipment.

Standardize Mixers

At a meeting of the Board of Directors, National Ready Mixed Concrete Association, the tentative standards for the operation of truck mixers and agitators was adopted. This takes the place of three independent standards promulgated by the association. Two types of truck mixers and agitators are covered: a closed or water-tight revolving drum suitably mounted and fitted with adequate blades attached to the drum, and an open top, water-tight trough-like container suitably mounted and fitted with adequate blades, revolving about an axis parallel to the axis of the trough. Among other provisions, the standard recommends 57½ percent of gross volume of drum when truck mixing, 70 percent when shrink mixing, and 80 percent when agitating; mixing shall begin within 30 min. after cement has been added and the hauling time shall be 1½ hours, starting with the time the cement makes contact with the water.

STANTON WALKER also presented his report. Reviewing the progress of the industry, he said that in 1925 there were only 25 plants while today there are 656 producers. In 1929 production amounted to 1,500,000 cu. yd., as compared with 10,000,000 cu. yd. in 1939.

Design of Concrete Mixes

STANTON WALKER, director of engineering, in his address briefly reviewed the history of the development of concrete design methods. Mr. Walker pointed out that while strength is about the only characteristic of concrete that can be measured directly, durability and impermeability should be given increasing consideration. While durability and impermeability may not be accurately determined, high strength concrete is generally durable and impermeable concrete if the ingredients are of good quality. Turning to the problem of testing concrete Mr. Walker said that it is essential that laboratory tests be made of cylinder specimens as the temperature and curing conditions are too variable in making field tests for strength of concrete.

By the use of tabulations written on blackboards, Mr. Walker outlined a simple procedure by which approximate strengths will be obtained for given proportions of cement, water, and aggregates. This information was published in the association's technical information letter No. 1, 1938, and may be obtained by writing headquarters for a copy.

Purchase Specifications

THIS SUBJECT was the first presented at the forum on operating problems. Ray Warren of Pittsburgh said that PWA and WPA specifications permitted the use of mixer rinse water but the quantity must be controlled. Twenty gallons is the limit permitted in the washout tank. Mixing in transit is not allowed. Another provision limits the use of aggregates on the job to one source; that is, aggregates from one or more plants of the same producer. Mixer trucks must also unload on a plane table or level. In answer to Mr. McCracken's question, Mr. Warren said that the government specifications had been formulated to control water content of concrete.

STEPHAN STEPANIAN, of Columbus, Ohio, said that these restrictions will kill the idea of the transit mixer, and that it is essential that some simple method be found to accurately determine moisture content of aggregates.

ALEXANDER FOSTER of Philadelphia, Penn., described the Warner Co. methods of control, using a central mix plant. With a 4 cu. yd. batch, one-half is chuted into the mixer truck and then inspected before the

Stanton Walker using the blackboard to outline his formula for designing concrete mixes at the ready mixed concrete meeting

rest of the batch is dropped into the truck. If adjustment is required, this is controlled by changing the water content of the second 2 cu. yd. of concrete. All aggregates are measured by weight, cement by weight, and water by weight or volume.

Length of Haul

LION GARDINER of the Jaeger Machine Co., mentioned that a simple hydrometer device had been developed to determine quickly moisture content of aggregates. Chairman Thomson suggested that perhaps better training of personnel and the use of more technical men would help to solve the problem of better control of concrete mixtures.

T. E. POPPLEWELL of Ft. Worth, Texas, said his company hauled ready mixed concrete up to 20 miles, but the highway department limited the length of time to one hour. Alex. Foster of the Warner Co. told about one experience of his company in which it was noted that there was a difference in color after a 14 mile haul at a high temperature (80 deg. F.). The concrete tended to ball up in the mixer, and this may have been due to overloading of the drum.

H. F. G. PELSUE of Los Angeles said his company sold concrete where the haul was from 10 to 14 miles, but this was for oil field work where ready mixed was purchased due to lack of water on the job or where large volumes were required in a short period. Chairman Thomson, in summing up the preceding discussion said that the overall economy was the primary factor in determining whether a certain haul was profitable.

IRVING WARNER referred to his experience which indicated a steady increase in the average mileage of hauls; 3.2 in 1937 to 5.5 today. Stanton Walker said that while specifications allowed 1½ hours for delivery of concrete, he had known where companies were required to wait 3½ hours before delivery.

CHAS. P. MALONEY of Washington, D. C., said his company had reduced the average haul to 3.5 miles. This has enabled the company to deliver more yardage and consequently more profits have been made. His company has delivered 185,000 cu. yd. of concrete annually, 60 percent of which was for small homes.

HERBERT JAHNCKE of New Orleans, La., asked about the economy of transfer plants near the site of the job. Mr. Stepanian then told about his method used on a large housing project in Columbus, Ohio., and described in detail in ROCK PRODUCTS (September, 1938, p. 65). He said there is a definite economy in hauling aggregates to a batch plant near the job. About 430 cu. yd. was hauled in 9 hrs. to batching plant in four trucks of 2½ cu. yd. capacity, a total of 15,000 cu. yd.

MR. BROWN of Dallas, Texas, told of his experience in dry batching at a cost of 10 cents per cu. yd. for transportation cost.

E. B. RAYBURN, JR., of Indianapolis, Ind., said his company had hauled as long as two hours without any trouble being experienced. No trouble in loss of slump was noticed up to 1½ hrs., except in temperatures above 90 deg. He called attention to the fact that the kind of cements vary as to consistency qualities.

Cold Weather Problems

IRVING WARNER of Philadelphia, Penn., said his company heated water only and not the aggregates. The temperature to which the concrete is heated runs between 55 and 60 deg. F. With a boiler rated at 1 hp. per cu. yd. per hour to heat the water the cost runs between 3c and 5c per cu. yd., or 5 lbs. of coal per cu. yd. of concrete.

J. F. McCracken, retiring president, N.C.M.A.

DONALD REYNOLDS of Boston, Mass., reported that his company generally heated water, but in severe weather steam is piped to aggregate bins. It was suggested that pipes and drum of mixer trucks be covered in winter with an insulation blanket.

HENRY BAYERL, Portsmouth, Ohio, told about his company's methods. Concrete is delivered at 80 deg. F. in 10 deg. below zero weather. Equipment includes a 40 hp. boiler, 550 gal. tank, and flow meter. Coils of pipe in bins heat the aggregates. Hot water is used to preheat the charge.

STANTON WALKER asked about experiences with flash set of concrete. Mr. Rayburn said his company had experienced flash set with water at 120 deg. F., which was furnished at the specific request of the contractor. Mr. Stepanian said they had limited the water temperature to 55 deg. in a 14 mile haul.

Methods of Handling

IRVING WARNER reported that it was his company's practice (in a central mix plant) to hold back the cement when hot water was mixed with the aggregates.

Two "Michiganders" looking over the exhibit. H. N. Battjes, Grand Rapids, left, and F. N. Anderson, Saginaw, right

H. F. G. PELSUE of Los Angeles said that some producers are delivering up to the third floor. The question of furnishing hoppers at the job site to eliminate truck mixer standing time also was discussed. It developed from the discussion that the practice should be limited only to those situations where it was an economy for the ready mix concrete producer by releasing his trucks for other jobs.

Control of Quality—Quantity and Testing

DONALD REYNOLDS of Boston described a cylindrical tank measuring device holding a cubic yard which is used as a check on loading of mixer and also to satisfy any customer. The practice of figuring contracts for ready mixed concrete on the basis of concrete placed in the form was condemned.

On the subject of testing Mr. Anderson advised that on his jobs the contractor makes his own cylinder specimens and tests. The company also makes periodical tests for its own check on the concrete. Mr. Pelsue of Los Angeles said that his company does not furnish tests.

PAUL BIRD of Boston reported that his company makes tests at the beginning of the job to assure contractor he is getting what he ordered regardless of whether or not the tests were requested. Mr. Rayburn of Indianapolis said that contractors get careless in making test cylinders during periods of critical temperatures from 40 to 50 deg. F. Cylinders are sometimes left outside when the temperature drops, and then later they complain when the cylinders show a lower strength. Mr. Anderson said his company insisted that all test cylinders be sent to his plant for curing. Another producer believed it was a good policy to make test cylinders about every hour for the customer in the interest of showmanship to build up confidence. *(Continued on page 72)*

Crushed Stone Industry For Seasonal Exemption

Convention votes to request a rehearing on the petition for seasonal exemption under Fair Labor Act

J. A. Rigg, newly elected president, National Crushed Stone Association

PRINCIPAL TOPICS of discussion at the National Crushed Stone Association convention were business conditions and outlook, government policies and their effect on the crushed stone industry, production problems, developments in agricultural limestone and some extremely timely papers dealing with specific markets for crushed stone. The twenty-third annual convention was held at St. Louis, Mo., January 22-24, immediately following the annual meetings of the National Sand and Gravel Association and National Ready Mixed Concrete Association.

The Association was fortunate in prevailing upon speakers of national prominence to come to St. Louis to discuss federal legislation, and to answer questions that have been bothersome to producers of crushed stone. Attendance was between 400 and 500, including active members, associate members and guests.

At the opening meeting, President T. I. Weston started things going with his opening address, in which he stressed the importance of crushed stone as a basic material contributing to the foundation of our present civilization. His address was followed by reports of the regional vice-presidents on business conditions, the reports of the administrative director and engineering director, and the report of the executive committee on the Association's application for seasonal exemption under the Fair Labor Standards Act of 1938.

New Officers

J. A. RIGG, Acme Limestone Co., Fort Spring, W. Va., was elected president of the National Crushed Stone Association. Other officers are W. E. Hilliard, New Haven, Conn., treasurer; J. R. Boyd, Washington, D. C., administrative director; and A. T. Goldbeck, Washington, D. C., engineering director.

The executive committee is composed of J. A. Rigg, Fort Spring, W. Va.; Otho M. Graves, Easton, Penn.; N. E. Kelb, Indianapolis, Ind.; E. J. Krause, St. Louis, Mo.; Russell Rarey, Columbus, Ohio; Stirling Tomkins, New York, N. Y.; A. L. Worthen, New Haven, Conn., and T. I. Weston, Columbia, S. C.

Regional vice-presidents re-elected are W. M. Andrews, New Castle, Penn., (Eastern); N. E. Kelb, Indianapolis, Ind., (Midwestern); W. T. Ragland, Raleigh, N. C., (Southeastern); A. J. Wilson, Watsonville, Calif., (Western); R. S. Wilson, Little Rock, Ark., (Southwestern), and Porter W. Yett, Portland, Ore., (Northwestern). New vice-presidents are W. C. Sparks, Princeton, Ky., (Central) and A. J. Cayia, Manistique, Mich., (Northern).

Board of Directors

The board of directors consists of W. M. Andrews, New Castle, Penn.; C. C. Beam, Melvin, Ohio; W. P. Beinhorn, Minneapolis, Minn.; H. E. Billman, St. Louis, Mo.; L. J. Boxley, Roanoke, Va.; Harold R. Brownson, Malden, Mass.; J. Reid Callanan, South Bethlehem, Penn.; A. R. Couchman, New York, N. Y.; C. M. Doolittle, Hamilton, Ont., Canada; F. O. Earnshaw, Youngstown, Ohio; Arthur F. Eggleston, Meriden, Conn.; Otho M. Graves, Easton, Penn.; A. Acton Hall, Piqua, Ohio; George Hammerschmidt, Elmhurst, Ill.; J. L. Heimlich, Le Roy, N. Y.; R. P. Immel, Knoxville, Tenn.; E. J. Krause, St. Louis, Mo.; Paul M. Nauman, Dubuque, Iowa; H. E. Rainer, Buffalo, N. Y.; Russell Rarey, Columbus, Ohio; John Rice, Easton, Penn. H. E. Rodes, Nashville, Tenn.; Dan Sanborn, Kankakee, Ill.; James Savage, Buffalo, N. Y.; F. W. Schmidt, Jr., Morristown, N. J.; O. M. Stull, Rocky Point, Va.; Stirling Tomkins, New York, N. Y.; R. N. Wallace, Bay Port, Mich.; Harold Williams, Boston, Mass.; W. F. Wise, Dallas, Texas; A. L. Worthen, New Haven, Conn.; T. W. Havely, Lexington, Ky.; J. D. Lane, Henderson, N. C.; T. I. Weston, Columbia, S. C.; L. W. Shugg, General Electric Co.; Roy Wills, Lima Locomotive Works; and Fred Braun, W. S. Tyler Co., new president of the Manufacturers' Division, National Crushed Stone Association, are the manufacturers' representatives on the board of directors, National Crushed Stone Association.

T. I. Weston, retiring president, National Crushed Stone Association

No decision has been reached yet regarding the time and place for the 1941 convention, but the best bet so far is Cincinnati, Ohio, subject to getting together with the National Sand and Gravel Association and National Ready Mixed Concrete Association.

Outside the regular business sessions, there was provided a full schedule of entertainment and group luncheons. An informal reception for everyone at the convention was held on the opening evening, followed by a buffet supper and the formal opening of the Manufacturers' Division Exposition. The other two evenings were set aside for the annual banquet and the convention cabaret. Speakers at the annual banquet were Dr. Allen A. Stockdale, National Association of Manufacturers, New York, N. Y., on the subject "Free Enterprise in Free America," and William H. Cameron, managing director, National Safety Council, Chicago, who presented the National Crushed Stone Association safety awards. Inland Lime and Stone Co., Manistique, Mich., was the winner of the safety trophy, and certificates of merit were awarded to 21

other accident-free quarries participating in the contest.

PAUL M. NAUMAN, Dubuque Stone Products Co., Dubuque, Iowa, was the winner of a handsome stainless steel waste basket given by the Cross Engineering Co., Carbondale, Penn. The contest was conducted in the Cross booth and the drawing made at the convention cabaret.

ELMER WHEELER, president, Tested Selling Institute and nationally-prominent lecturer, was the speaker at the greeting luncheon on the subject, "Magic Words that Make People Buy." Charles M. Hay, Hay and Flanagan, Attorneys, St. Louis, Mo., spoke on "What's Right with the Country" at a general luncheon sponsored by the Manufacturers' Division.

Seasonal Exemption

OTHO M. GRAVES, president, General Crushed Stone Co., Easton, Penn., presented the "Report of the Executive Committee on Application for Seasonal Exemption under the Fair Labor Standards Act of 1938." The Association on behalf of the crushed stone industry had applied for seasonal exemption under the

Otho Graves, addressing the convention

Act and had its application heard at a public hearing in Washington, D. C. Since then supplemental information in support of the original application had been developed under the direction of Mr. Graves and submitted for consideration in September, 1939. The ruling was that for the industry to be eligible for exemption 90 percent of the industry must be idle for six months of the year.

It was voted to petition for a review of action to re-open the hearings, the purpose of the petition being to prevent competition unfair to crushed stone.

EDITOR'S NOTE: Since the holding of the convention, the National Crushed Stone Association has filed a request for a rehearing with the Administrator.

Business Conditions In the Crushed Stone Industry

BUSINESS CONDITIONS in the crushed stone industry in 1939 and the outlook for 1940 were reported by the regional vice-presidents, each representing a section of the country. The reports were favorable in some sections of the country and the reverse in others.

H. H. WAGNER, Pennsylvania Stone Producers Association, Harrisburg, Penn., reporting for W. M. Andrews, Eastern regional vice-president, said that there was a general decline in business throughout that territory in 1939. Volume of business was about 10 percent less than in 1938 and represented about 60 percent of production capacity. Prices were about the same as in 1938 and the distribution of sales was 80 percent for highway construction, 15 percent for railroad ballast and the remainder for various types of building construction.

A further decrease in business is expected for 1940 especially in Massachusetts where expenditures for construction have been curtailed. The situation is better in Connecticut where 81 percent of the tonnage went into highway construction, 14 percent for railroad ballast and 5 percent miscellaneous construction. The tonnage for 1940 is expected to equal that for 1939 with some increase in the railroad ballast tonnage.

Business conditions in the metropolitan New York area were about 20 percent better in 1939 than in 1938, and prices were higher. Considerable tonnage in this area is handled by dealers. Prospects for 1940 are about the same as in 1939.

Business conditions in Eastern Pennsylvania were about the same as for 1938, representing a sales volume less than 50 percent of capacity. The distribution was 90 percent for highway construction, 5 percent for railroad ballast and the rest miscellaneous construction. Prospects for 1940 in this area are slightly better. Railroad ballast tonnage is expected to increase and PWA construction will be less. Some increase is anticipated in highway construction because of the general feeling aroused against diversion of state highway funds.

Conditions in western New York and western Pennsylvania were unfavorable both in volume and price. In western New York sales were about 50 percent of capacity, and the distribution, 78 percent for highway construction, 10 percent railroad ballast and 6 percent agstone. Prospects for 1940 are better with increases expected in building and railroad ballast. It is anticipated that less highway funds will be diverted in 1940.

Conditions were about the same in western Pennsylvania. With steel pro-

W. F. Wise, Dallas, Tex.

duction up, chemical and metallurgical stone volume was up. The distribution was about 30 percent for highway construction, 61 percent chemical stone and 3 percent agstone. Conditions for 1940 are expected to be better. There is anticipated a favorable demand for chemical stone, and the Pennsylvania superhighway now under construction is expected to take 1,000,000 tons of crushed stone. Generally, 1940 is expected to be the best year in the last 10.

J. A. RIGG, reporting for the central region, including Ohio, Kentucky, Virginia and West Virginia, said that the average volume of business done in 1939 was about 10 percent greater than in 1938. Some producers had reported declines and some increases in volume up to 25 percent. About half the producers reported declines in prices and the others reported no change. Volume was 55 to 60 percent of capacity. The distribution was 67 percent for highway construction, 7 percent building construction, 5 percent agstone, 8 percent railroad ballast, 11 percent chemical stone and 2 percent miscellaneous. The outlook for 1940 is about the same as in 1939 without further price decreases since costs are up.

For the southeastern region, H. E. RODES reported a 1939 volume of business and price level equal to those for 1938. Prospects for business are con-

W. H. Wallace, Bayport, Mich.

sidered fair for 1940 with probably the same price level.

Volume of business was reported as 10 percent lower in 1939 as compared to 1938 in the northern region. Prices remained the same and plants produced about 60 percent of their capacities. In 1940 an increase in highway construction is expected.

In the absence of a report from the southwestern region, W. P. Wisz, Dallas, Texas, reported conditions of his company. Volume was about the same as in 1938 and prices 10 percent lower. Demand was about 25 percent of capacity and the distribution, 70 percent for highway construction, 15 percent railroad ballast, building construction one percent, chemical stone one percent, agstone one percent, and 12 percent miscellaneous. Demand and prices are expected to hold the same in 1940.

The report for the midwestern region, including Indiana, Illinois, Missouri, Iowa and Kansas showed a slight average increase in volume of business. Prices were the same as in 1938, possibly slightly lower. Distribution of sales was 20 to 40 percent for highway construction, 5 percent railroad ballast, 5 to 20 percent building construction, chemical stone up to 25 percent and agricultural stone from 10 to 20 percent. Demand is expected to increase in 1940 with prices remaining the same, making it difficult to make a profit because of increasing costs.

Volume of business in the northwestern region was about 1,000,000 tons, the same as in 1938. Portable plants had two-thirds of the total volume. Prices remained the same but costs were higher. Distribution of business was 75 percent for highway construction, 15 percent railroad ballast, and 10 percent building. Prospects for 1940 are for an improvement with the demand for railroad ballast increasing.

Quarry Haulage Problems

STIRLING TOMKINS, president, New York Trap Rock Corp., New York, N. Y., presented a paper on "Quarry Haulage, illustrated with moving pictures showing the use of light tractors with high capacity semi-trailers to haul stone in its New York state quarries. Mr. Tomkins briefly sketched the evolution of quarry haulage equipment from the days of hand-loading and mule haulage through the development of the power shovel to the appearance of motor trucks in quarries back in the early 1920's.

Having had some experience with light truck units in the $1000 to $1200 class on other kinds of work, the company decided that trucks of this size would stand up in quarry service if the haul was nearly level, good roads were built in the quarry and a trailer could be balanced so that the weight placed on the fifth wheel mounted on the truck chassis could be held down. The final distribution of that weight is about 61 percent on the trailer axle, 31 percent on the rear truck axle and

Stirling Tomkins, New York, N. Y.

8 percent on the front axle of the truck.

The first seven haulage units purchased were standard light trucks with the addition only of a heavy-duty clutch, some frame and spring reinforcing and a fifth wheel on the chassis frame, costing about $1100. Trailers were designed to carry 10-cu. yd., side-dump bodies. Mr. Tomkins discussed, and illustrated, in some detail a double hinge which was designed to cause the body, after tilting, to return to its original position, when used with an exterior dumping hoist at the crusher. In connection with the dumping operation, outrigger shoes were provided so that all the weight was transferred to the hopper at the crusher, relieving the truck and trailer of all strain.

At the time the installation was made the quarry roads were completely rebuilt and an old-fashioned type of waterbound macadam was selected, which has, with constant care and attention, stood up well.

Aside from the transportation angle, the trailers have been advantageous for increasing shovel output. Shovel buckets were increased in size from 3-cu. yd. to 3¾-cu. yd. and from 4-cu. yd. to 4¾-cu. yd. and 5-cu. yd. Twice the amount of material that was handled in two shovel swings before is now handled in three swings, thereby increasing shovel output.

A large part of Mr. Tomkins' paper concerned a system devised in one of the quarries to utilize semi-trailers to haul up a 10 percent grade a distance of 600 ft. Large tractors were tried, but were found unsatisfactory. Finally, two hoists and a barney car, which is engaged to the truck at the foot of the incline, was used to pull the truck while in neutral to the top of the incline. The trucks operate on their own power in the quarry and after reaching the incline head. With this arrangement, flexibility is retained and trucks are easily handled at the rate of 50 per hour. New York Trap Rock Corp. has purchased 29 semi-trailer trucks in less than a year from the time the first units were ordered and now has them in all its quarries.

In response to questions following reading of his paper, Mr. Tomkins said that the average round-trip haul in all the quarries is 0.7 miles and the average loaded weight is 53,000 lb. The average mileage gained is 3.46 miles per gallon of gasoline which means that five round trips are completed on one gallon of gasoline.

Operation of Pneumatic Tires

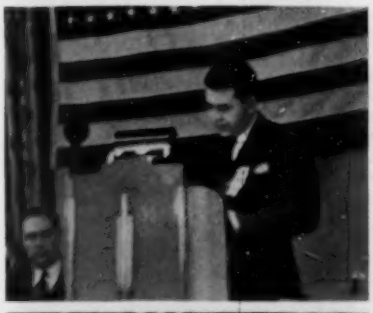
G. M. WRIGHT, Development Department, Goodyear Tire and Rubber Co., Akron, Ohio, gave some practical pointers and precautions on how to prolong tire life in a paper, "Pneumatic Tires—Their Use and Care in Quarry Service." In reviewing progress in tire manufacture and applications, Mr. Wright said that pneumatic tires first became widely used about 1927. During construction of Boulder dam and later at Norris dam, pneumatic tires were first used under quarry conditions.

Mr. Wright said that the life of a pneumatic tire is shortened by 18 percent if it carries an overload of 10 percent. An overload of 30 percent will shorten life by 43 percent. The tendency is to "under tire" trucks in the quarry industries because of highly competitive conditions, in Mr. Wright's opinion.

He also discussed the various treads which have been developed for quarry service. A large tread is usually preferable and with the spacing designed to spread shocks. If the treads are too close together, stone chips will be picked up and eventually cut into the casing. Treads must be designed far apart, for traction, when hauling on soft, chalky rock that becomes slippery when wet. The trend in design for traction tires is toward one direction, angled treads that are self-cleaning.

Correct air pressures are considered of utmost importance in prolonging tire life. Too great a pressure reduces resistance to impact and subsequent cutting, and under-inflation results in excessive flexing and fatigue of the cord. Constant flexing develops heat which is detrimental to tire life. Under-inflation of 10 percent will decrease tire life by 30 percent and 30 percent under-inflation will reduce tire life by 33 percent, said Mr. Wright. Ordinarily, atmospheric changes affect tire pressures only a slight degree. At times of extreme temperature change, it is considered advisable to adjust tire pressures. Under-inflation sometimes causes slippage on the rim and undue wear.

Mr. Wright concluded his talk with a list of precautions to be followed to get the most out of pneumatic tires. He emphasized the importance of selecting the correct size and type of tire for the job and suggested following the recommendations of tire manufacturers who have studied the subject of quarry haulage. Regular inspection and the removal of chips and other imbedded materials as soon as discovered was advised. New tires should be installed on the drive wheels and the replaced tires worn out on the trailers. Valve caps should always be kept on the tubes.



Speakers at the National Crushed Stone Association convention. Fig. 1: G. M. Wright, Goodyear Tire & Rubber Co., speaking with the new president, J. A. Rigg, presiding. Fig. 2: N. E. Kelb, who presided at one of the sessions. Fig. 3: F. H. Greime, Civil Aeronautics Authority. Fig. 4: H. C. Neville, Farm Advisor, Harrisburg, Ill.

Public Works—Highways

J. R. Boyd, administrative director, in his annual report enumerated the activities of his office during 1939 and commented briefly on the various new legislative measures. He discussed in some detail the effect of curtailing federal aid for highway construction to the proposed figure of $146,000,000 for public highways in the 1941 budget. This estimated amount, which is to be administered by the Public Roads Administration, will be broken down to $100,000,000 for the federal aid highway system, $15,000,000 for secondary feeder roads, $30,000,000 for grade crossing elimination, and $1,000,000 for public land highways. The 1940 budget for general public works has been reduced from $756,000,000 to $498,000,000 in the 1941 budget.

H. E. Rainer, Buffalo, N. Y., presided at a session given over mostly to a discussion of public works including highways.

John N. Edy, executive assistant, Federal Works Agency, did not attempt to read his paper, but merely touched a few "high spots." He first described the need of coördinating federal public works and the progress thus far made. He said the new agency is interested in providing useful structures as well as providing work. Mr. Edy quoted the figures in the President's budget message as the probable expenditure for federal public works. He said public works planning should be on a long time basis—that meant local work as well as federal. The National Resources Board is helping local authorities to do this.

Elmer C. Lawton, assistant commissioner of highways, New York State Department of Public Works, went into much detail on his state's experience with "class-H cold asphaltic concrete." The chief consideration is that the asphalt content must not exceed the voids in the crushed-stone aggregate. Therefore the mixtures are designed deliberately to be lean. Nine sizes of crushed stone are used—he tries to keep the number of sizes a minimum. One interesting requirement of the specification is that the crushed-stone producer shall have a Rotap testing screen at each plant for the use of the state inspector.

The mixtures are usually made by the crushed-stone producer or by a contractor who locates his mixing plant on the quarry property. This type of asphalt surfacing material, incidentally, has been a life-saver to the New York State quarry industry. Dried stone is used with about 0.8 percent of hydrated lime, naptha being used to cut-back the asphalt. While, as Mr. Lawton said, the tendency is toward dense mixes in this type of pavement, he had had excellent experience with this more open type, non-skid mixture. It is expected that it will have to be resurfaced from time to time.

The chief essential of this mixture is a dry, clean crushed stone. Controls

R. R. Litehiser, Ohio Highway Department

have been developed for the asphalt mixers similar to the controls on modern portland cement concrete mixers. Mr. Lawton distributed copies of the New York State specifications, and said the purpose of his talk was merely to emphasize some of the most important points. The sizes of aggregates used are as follows:

SIZES OF STONE, GRAVEL AND SLAG
Percentage by Weight Passing the Following Square Openings

	4 in.	3½ in.	2½ in.	1⅞ in.	1 in.	½ in.	¾ in.	⅜ in.	No. Sieve 80
Screenings*	.....	.....	.....	.....	.....	.. 100	90-100		0-15
1B	.....	.....	.....	.....	.....	.....	.. 100	90-100	
1A	.....	.....	.....	.....	.....	.. 100	90-100	0-15	
1	.....	.....	.....	.....	.. 100	90-100	0-15		
2	.....	.....	.....	.. 100	90-100	0-15			
3A	.....	.....	.. 100	90-100	0-15				
3	.....	.. 100	90-100		0-15				
4	.. 100	90-100	0-15						
5	90-100	0-15							

* Tyler Standard Screen Scale Sieves

R. R. Litehiser, chief engineer, Bureau of Tests, Department of Highways, Columbus, Ohio, discussed "Highway Experience with Crushed Stone in Ohio." He began by complimenting the National Crushed Stone Association on A. T. Goldbeck's services to the highway engineering profession. From that he launched into the subject of the geology of the state with particular reference to its limestone and dolomite deposits. A history of the development of various road types followed. He touched on the use of stone sand, saying that cores from concrete pavement showed it to be an apparently satisfactory material.

On the subject of testing Mr. Litehiser seemed to favor the Los Angeles rattler test for soundness in preference to the sodium sulphate test, which would have resulted in the rejection of some aggregates that have given good experience. The freezing and thawing test he thought took too long to be used as a routine test. He concluded his remarks by showing lantern slides of some new structures in Ohio.

Dawes E. Brisbine, research counsel, National Highway Users Conference, speaking on the subject of "Meeting the Problem of Diversion of Highway Funds," traced the history of highway development in the United States, bringing it down to the recent passage of constitutional amendments in several states to prevent further diversion of highway funds. He said there were only two ways to prevent diversion: (1) education; (2) constitutional prohibition. He estimated direct diversion of state highway funds in 1937 as $198,000,000, or "enough to build three coast-to-coast highways." Many counties and cities are diverting state highway money turned over to them, and the amount of this diverted, Mr. Brisbine thought, would about equal another $198,000,000.

Sam. C. Hadden, executive secretary, Indiana Mineral Aggregates Association, told how they had organized in his state to adopt a constitutional amendment to prevent gasoline and motor vehicle tax diversion. There has been organized a separate and distinct Indiana Automobile Taxpayers' League. Most taxpayers' leagues have to do with real estate, but this one concentrates on motor vehicle taxes. It is using educational methods, after having failed to get a constitutional amendment through two sessions of the legislature, as the law requires. It went through one session; then some one got the farm organizations to oppose it through fear that a state gross income tax would be substituted for it.

Airport Construction

Airport construction may turn out to be an important market in the future for aggregates, according to a paper, "Expanding Our Airport Facilities," presented by F. H. Greime, Assistant Chief, Airport Section, Civil Aeronautics Authority, Washington, D. C. Airports are considered as a necessary part of our defense system, and legislation has already been introduced in Congress to provide for federal participation in financing airport construction.

Agricultural Limestone

Dr. E. E. De Turk, professor of soil fertility, University of Illinois, Urbana, Ill., painted an optimistic future for agricultural limestone, based on the necessity of liming soils, in a paper "The Effective Liming of Agritural Land." Much of Mr. De Turk's talk was concerned with what takes place in the soil when limestone is added and from his technical discussion he developed the basis for grading standards of agstone which is used in the state of Illinois.

The first car of agricultural limestone was shipped in Illinois in 1906, and since then shipments increased steadily from 375,000 tons in 1919 to 1,256,854 tons in 1937. In discussing the adaptability of limestones for rebuilding the soils, he said that chemical purity, 90 percent or better $CaCO_3$, was necessary. A low-grade stone, however fine it is ground, is of no value in liming the soil.

In the state of Illinois a score card has been developed to determine the quality of agstone and as a basis to give credit for fine material in the stone. The quality rating card used in Illinois is as follows:

Percent through	100-M.	× 1.15
Percent between	48-100 M.	× 1.00
Percent between	28- 48 M.	× 1.00
Percent between	14- 28 M.	× .95
Percent between	8- 14 M.	× .80
Percent between	4- 8 M.	× .33
Percent over	4-M.	× .0

Adding up the various items gives a quality rating, which will run between 75 and 86 for all limestones used. An ultimate rating of 90 is desired. A product 80 percent minus 8-mesh will ordinarily give a rating that high, but any finer grinding increases costs too much. The chart makes a definite division, between 4-mesh and 8-mesh, as distinguishing between good and undesirable particle sizes.

(Continued on page 54)

Fred Braun, the new chairman of the Manufacturers' division, National Crushed Stone Association

Saving With Instruments

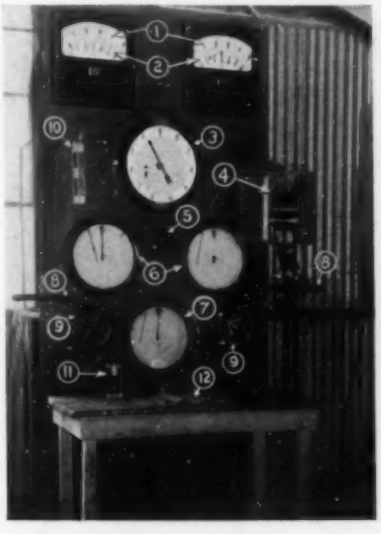
Proper use of instruments by a trained personnel will result in substantial fuel economies in every lime plant

By VICTOR J. AZBE

VERY RECENTLY a lime plant was subjected to an inspection and test in the course of which it was found that in one unit consisting of a gas producer and kilns producing 65 tons of lime per day, the sum total of instruments was one steam gauge. About twenty thousand tons of lime produced for a fuel cost of close to thirty thousand dollars each year and the only operating aid was one ten dollar gauge.

Let's compare this with a switchboard of the measliest little steam plant generating electric power or the panel of the $600 automobile, and we are forced into the full realization of the crudity of many present day lime plants. The fuel goes in, and some lime comes out; how much fuel is seldom known, what happens to it even less is known and what to do about it is rarely considered. Some plants with virtually the same kiln equipment give results 25 percent better than others. If the management knows at all that they are poor, they have nothing to go by to correct the condition.

Although cost keeping in lime plants is notorious, still some sort of a financial balance is arrived at. However, this is not true with kilns in most plants, as many thousands of dollars are spent without an inkling of what happens to this money which is converted from coal into heat. One company whose fuel cost alone is in excess of $600 a day does not have a single man fully qualified to follow this large sum through the process and strike a balance and evaluate the useful as well as the waste.



Instrument board in modern lime plant: 1—Draft in kiln at fan connection, 2—draft in kiln in hot zone, 3—recording indicating pyrometer, 4—Orsat for CO_2, O and CO, 5—multi-switch for pyrometer, 6—gas flow recorder, 7—gas pressure recorder, 8—gas regulating valves, 9—damper regulating wheels, 10—V-type draft gauge for general testing, 11—optical pyrometer for hot zone temperatures, and 12—record for fireman

LIME FORUM

Mr. Azbe is a contributing and consulting editor of ROCK PRODUCTS. He will be glad to receive inquiries from his readers, and will answer these direct or through the columns of this Forum.

Kiln Technicians Are Scarce

Lime kiln technicians are scarce to the point of non-existence, but how can there be technicians if there is a lack of a means to train them? Colleges cannot turn them out, and as to plants one can put the potentially best man to operate a series of kilns, but without instruments to create both the possibility as also the desire, the required ability to make the very most of the equipment cannot be developed. The right sort of instruments not only indicate the fluctuations and make control possible, but they throw light on the subject. Observing persons are thus trained and little by little they change from mere guessers to plant officials whose knowledge is based on something tangible.

The writer has developed about 100 technical charts which if properly applied reveal kiln efficiency with respect to fuel or to capacity. Many have been published, but it is very doubtful if in all the United States many are used. With the help of some instruments they would reveal so much and change any lime kiln from an ugly, bulky mass into something animated, often perplexing, but always interesting.

The lime industry never will be completely out of the woods unless it develops kiln technicians. At present it has some exceedingly good superintendents and some very good chemists, but virtually no one that understands the kiln in its practical as well as scientific aspects, which is a different type, differently trained man. But they are needed and will be needed more so all the time, and instrumentation of plants will eventually bring with it this type of man.

Instruments must be properly chosen, properly applied, and the results properly interpreted, which is difficult. Application of interpretations also is difficult. Over-instrumentation is inadvisable; the only instruments that should be on the board are those that really can be used. More add to cost and to confusion. Some kilns will demand more, others less.

Instruments Required

When natural gas is the fuel, it is beyond our understanding how the kiln can be operated right, unless there is a gas meter on each kiln. If the kilns are large, a recording type meter should be used, but if kilns are small, the arrangement can be simpler, consisting of a manifold from which burner pipes would receive the gas through definite sized orifices. Tables can readily be secured that give the amount of gas passed by an orifice under any pressure in the manifold. To regulate, all that needs to be done is to regulate the manifold pressure and from this pressure it can be determined definitely how much gas the kiln uses at any moment.

Regulation should be such that on natural gas kilns no smoke should show, since if there is even a little smoke, incomplete combustion is certain and CO and often hydrogen and methane is escaping. A loss as great

as 35% was found on certain kilns, caused by the escape of unburned products.

Then again, when the kiln is connected to a fan, certainly the kiln draft should be known. Kiln capacity varies greatly with gas temperature and after stone charging, the draft is much stronger than later after the gases warm up. When there is a gauge and a damper, they should be regulated so that the draft is constant.

Draft gauges should be of a good mechanical-bellows type. The differential oil-filled glass tube gauge is no good. The first is reliable and the figures are large, and often the face is internally illuminated so it can be read over a long distance even at night. Such gauges, once installed, are always used, while the other cheaper type with oil or water fill are soon discarded.

Home-made gauges can be used but they are a false economy. Buy a nice costly gauge and mount it respectably, which will react on the men so they will give it more attention, and in a short time the gauge is paid for.

When the kiln top is closed, a pyrometer can be used to very good advantage. One to each kiln, when the kilns are of the large high capacity type, and one for several small ones with a switch so instrument connection can be shifted to different thermocouples. Pyrometers reveal conditions which would save many fans from serious heat damage.

A hand gas testing machine is very desirable and often necessary, and one need not be a college man or office man to use it. We know of many regular kiln firemen that do. Automatic machines are also available but they are rather costly. One records CO_2 and oxygen, the other CO_2 and unburned gases.

Gas and draft controls, wheels or levers, as well as stop-start buttons for fan motors should all be located at the instruments. The whole idea is presented nicely in the illustration which shows the Beachville plant two-kiln instrument and control board.

Of course, having the instruments is not all that is necessary; one must know how to interpret the results and that is not simple but some good will immediately be obtained and then month after month one will get better at it. If there was a demand, ROCK PRODUCTS would publish draft drop charts for various kiln capacities, charts for interpretations of gas analysis into kiln fuel efficiency and combustion efficiency.

Production Problems

(Continued from page 52)

RESEARCH FACILITIES of the National Crushed Stone Association have been used in a variety of studies during 1939 and will continue to be important in 1940, according to the report of engineering director A. T. GOLDBECK.

In addition to a variety of engineering activities, the engineering staff under Mr. Goldbeck's direction has been carrying on two researches of fundamental importance to the industry. One has been in the design of the flexible type of road, the other on the influence of flat and elongated pieces in crushed stone on its concrete-making properties.

A. T. GOLDBECK, engineering director of the National Crushed Stone Association, discussed the desirability of crushing stone so as to avoid flat or elongated pieces. This is being done in many quarries. How much the shape of fragment produced is dependent on the kind of stone, or the nature of its stratification, no one seems to know. Apparently there is a relation between shape and the crushing method employed. A high ratio of reduction is generally to be avoided. Stage reduction in ratios of 2 to 1 or 1½ to 1 appears to result in better shaped fragments.

A. G. SEITZ, General Crushed Stone Co., Syracuse, N. Y., backed up Mr. Goldbeck's theories by submitting actual results on particle shapes obtained under varying crushing conditions. In one instance, using five stages of reduction, with an original feed of 1⅛-1½-in. stone, the product was all cubical. Using a larger crusher and a higher ratio of reduction, with a feed of 1¾- to 2¼-in. stone, the crusher product over ⅝-in. was cubical and minus ⅝-in. material contained flats.

In primary breaking, using a jaw crusher, Mr. Seitz found it advisable to open up the jaws to hold down the production of flats. In secondary crushing he has found that if the feed contains flats, flats will occur in the final product.

Federal Legislation

A talk by L. METCALFE WALLING, Administrator, Government Contracts Division, U. S. Department of Labor, Washington, D. C., on "The Determination of Prevailing Minimum Wages for the Crushed Stone Industry Under the Walsh-Healey Act" did much to clarify certain provisions of the law and left the impression that there still is such a thing as coöperation between industry and government.

To date there have been 20,000 contracts let, totalling $1,600,000,000, subject to provisions of the Act since its enactment, and there have been 40 minimum wage determinations made affecting 2,000,000 people. The Act has provisions for safety and health conditions not included in the National Labor Relations Act.

Governmental Policies Covering Labor Relations

JOHN C. GALL, Counsel, National Association of Manufacturers, New York, N. Y., spoke on "Governmental Policies in the Field of Labor Relations," dwelling particularly on the National Labor Relations Act. After the address he replied to questions asked from the floor.

He said that the Act fits the scarcity pattern for labor in that it, like other legislation on child labor, school laws, unemployment compensation, etc., is designed to relieve pressure on labor. One of the things which has made the Act difficult in interpretation is, in his opinion, the lack of a definite legal definition for collective bargaining.

Governmental control and likely trends which it might take in the future, particularly as it relates to prices, was discussed in a paper "Price Control By Government," by EDWIN B. GEORGE, associate editor, view, Dun and Bradstreet, Inc., New York City.

Mr. George's talk dealt with types of government interference in prices, weaknesses in carrying out some of its ideas, and ideas that are likely to come next. In his opinion, Washington has plans to broaden its control of prices, by fixing prices, fixing the plane of competition in business or by establishing more direct competition. Governmental legislation as applied to specific cases was mentioned as examples of trends to come, notably the establishment of rates of wages and investigations into unfair trade practices.

That workmen are individuals and should be treated as such in order to draw out their point of view was emphasized in a talk, "Getting the Workman's Point of View," by JAMES W. IRWIN, assistant to the president, Monsanto Chemical Co., St. Louis, Mo.

Mr. Irwin's talk was directed toward ways in which executives may improve relationships with their employes, by building up a spirit of friendly leadership that will create on the part of the workman a more wholesome reaction to criticism, etc.

MAKING WHITE CEMENT

AN OUTSTANDING DEVELOPMENT of 1939 was the establishment of a white portland cement plant at Carrara, Nev., by the recently-organized Carneva Portland Cement Co. Thus far it is only a pilot plant of 50 bbl. daily capacity, but it is now in production in order to study details of operation which best maintain the purity of the raw materials and the whiteness of the finished product.

Test runs have proved satisfactory and plans are in progress for establishment of a plant of 1000 bbl. daily capacity. Location of the plant is in Nye county near the source of supply of all raw materials, including gypsum. Principal raw materials are a white marble and a white silica-alumina clay, both of unusual whiteness and practically free from iron oxide and other objectionable compounds. Operations consist of crushing and pulverization of raw materials, passage through an oil-fired 30-in. by 30-ft. rotary kiln, and grinding of the clinker through a 6- x 7-ft. ball mill.

Typical analyses of the raw materials, clinker and cement are as follows:

	Marble	Clay	Clinker	Cement
SiO_2	.96	71.86	27.22	26.50
Al_2O_3	.00	13.04	5.60	5.59
Fe_2O_3	.04	.00	.17	.17
CaO	55.20	.00	66.00	64.30
MgO	.07	.00	.25	.25
SO_3	.00	2.80	.00	1.67
Loss	43.60	12.10	.13	1.38
Total	99.87	99.80	99.37	99.86

Cement—
Initial Set—3 hrs. 10 min.
Final Set—5 hrs. 10 min.

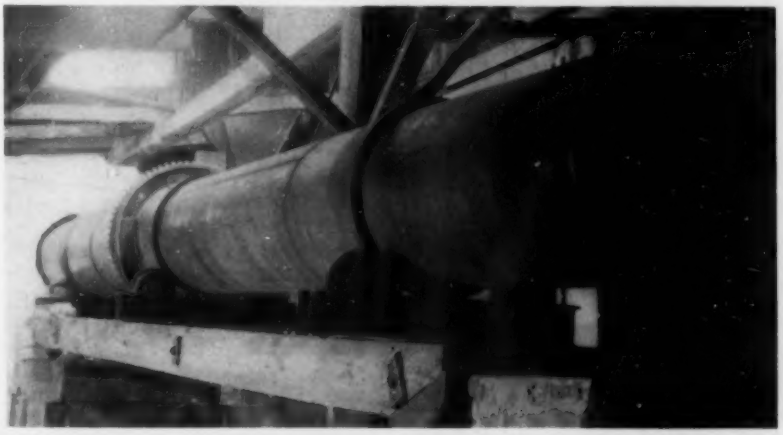
Clinker—
Pat boil—O.K.

In order to preserve the extreme whiteness of the materials, raw material elevators are of non-corrosive construction with rubber belting and galvanized buckets. The kiln is lined with 4-in. General Refractories Chrome-Free Ritex bricks which are subjected to temperatures of about 2800 deg. F. It has been found unnecessary to quench the clinker as it comes from the kiln. The hot clinker elevator is of special low corrosion

(Continued on page 88)

Harry E. Mick, president and general manager, and widely known in cement circles

Above: White marble deposit which is to be used as a source of material for white cement



Above: Small kiln to manufacture white portland cement clinker

Right: West side of pilot plant built to test out raw materials

Hints and Helps

★ FOR SUPERINTENDENTS ★

Convenient Method of Handling Cement

SACKED CEMENT is elevated by belt conveyor and emptied into a bulk cement bin by the Ready-Mixed Concrete Co., Inc., Chattanooga, Tenn. The belt conveyor is 24-in. wide, 200-ft. centers on an 118 deg. incline, and is the same one used for conveying sand and gravel from a rail hopper. In unloading a car of cement in sacks, the belt is dried first by pressing rags on the carrying side as it turns empty. This takes just a few minutes. Sacks are clipped in the car and are slid down a movable steel incline, as shown, at definite intervals with the open tops pointing upward. Upon transferring to the belt, the open ends are down and the sacks are conveyed at the rate of 200 f.p.m. to the turn head at the head of the conveyor, spaced 8 to 10 ft. apart. Here, a man grabs each sack at the corners and empties them through a spout as they come between his outstretched legs.

Showing how cement in sacks is handled, by opening in the cars, and transferred into a bulk cement bin

Prolonging Life of Dredge Pipe

COLUMBUS SAND AND GRAVEL CO., Columbus, Miss., has devised a method of cutting the cost of maintaining dredge line pipe which have threaded ends for flanges. Threading of the pipe reduces its thickness to one-half in the threaded area, causing this part to wear through before the rest of the pipe does. To prolong the life of the pipe, the plant superintendent devised a connection which eliminates threading.

Threaded ends of the pipe as well as the threads in the flange are cut out. When new pipes are bought they are supplied without threads. A circular piece of strap iron ⅜ in. thick and ¾ in. wide is spot welded to the end of the pipe, its inside circumference being equal to the outside circumference of the pipe.

The flange is bushed out ⅜ in. thick straight back ⅝ in. and then is tapered out of the normal inside circumference of the flange. With a ⅝ in. bushing distance instead of ¾ in., a much snugger fit is obtained when the adjoining flanges are bolted together. The normal inside circumference of the flange is made to fit snugly around the outside circumference of the pipe, which is 10 in.

When the flange is put in place, the bushed out area fits over the strap bolted on the end of the pipe, and is brought up so that the front face of the flange is in the same plane as the front edge of the strap.

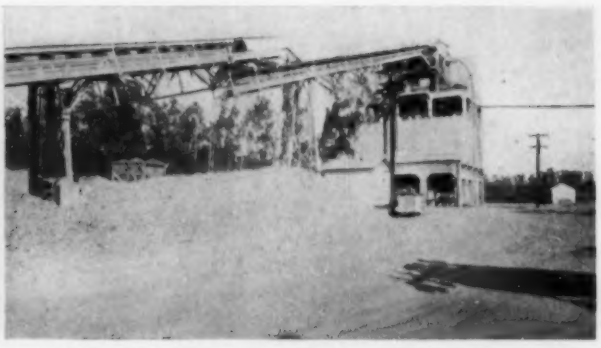
Pieces of ordinary ¼ in. copper taken from an old 3300-volt power line are welded into circular shapes of a diameter which will permit them to fit just inside the bolt holes of the flanges. When the flanges of the respective pipe to be joined together are brought in position, this wire band is inserted and the bolts are drawn up. The copper, being soft, will flatten and form a tight seal. When the pipe so connected are first put into service, there will be slight leaks where the inside circumference of the flange has been machined to fit the outside circumference of the pipe snugly. After a little usage, it has been found that sand, silt and debris will seal this up and a tight connection will result. When a pipe is finally worn out, the flange is merely lifted off and fitted to the new one and drawn up again.

Intermediate Storage Between Pit and Plant

ANOTHER WAY of providing intermediate storage of aggregates between the excavation and the plant for later reclamation is this conveying system used by Saticoy Rock Co., Ventura, Calif. It consists of two belt conveyors, one following the other, from the primary crusher in the background to the plant. Material

Left: Pipe fitting showing rim on pipe and bushed-out flange. Right: View of pipe fitting with flange in place

Left: Looking down into surge storage pit from the head of the conveyor. Note how two conveyors are split for the purpose of stocking material



Right: Showing how material is dropped into storage at the split between the two conveyors. Plant is sturdily built with concrete superstructures over bins

either passes direct to the second belt from the first or drops into the storage area shown for reclaiming later by an underground belt to the first conveyor. There are three possibilities with this arrangement; the entire plant can be operated, the pit and crusher may be continued in service, or the screening plant may be operated separately.

Preventing Cutting of Conveyor Belting

TO PROTECT conveyor belting from cutting, Stockbridge Stone Co., Stockbridge, Ga., makes good use of an old piece of conveyor belting. At the tail pulley of a belt conveyor receiving its feed from an overhead bin, a piece of old belt is fastened, as shown, to the conveyor framework and rides on the pulley face. A slight pressure is exerted on the pulley by the natural tension in the piece of belt. The purpose, of course, is to prevent sharp pieces of stone from getting between the conveyor belt and pulley and tearing the belt. Any stone that gets in on the under side and which might carry up to the top side of the pulley

Tail pulley of belt conveyor receiving stone from hopper. Note how piece of old conveyor belting is used to prevent stone from lodging between pulley and belt

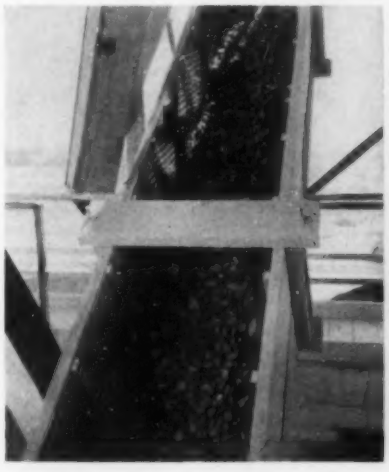
will naturally be scalped off and prevented from again entering between pulley and belt.

Preventing Side Wear on Bin Chutes

FROM TIME TO TIME descriptions have been published in ROCK PRODUCTS of bin chutes in aggregates plants where different methods have been employed to reduce wear by abrasion. Aside from the use of rubber-lined chutes for wet conveying or maybe a nickel alloy for dropping dry materials into bins, some form of cross members spaced along the bottom of a chute usually have been the solution. The effect is to retard the flow and build up a gravel or stone "roadway" over which other material flows.

At Arcadia, Calif., Blue Diamond Corp. of Los Angeles, uses this idea but goes a step farther in an attempt to prevent side wear on wood chutes. As shown below, a plasterer's-type metal lath is nailed to the sides inside a wood chute. Openings in the mesh are nearly the size of the stone handled, so that stone sides are built up by stone lodging between the wood sides and the metal.

Left: Plasterer's wire mesh used to prevent wear from abrasion on sides of wood chute. Right: Angle iron cross members in steel chute to retard flowing material



Keeping Truck Mixers Attractive

A CLEAN, attractively-painted truck mixer is considered the best advertisement for ready-mixed concrete by Concrete Construction and Supply Co., Columbia, S. C. Truck mixers are attractively painted with appropriate signs and a regular routine is followed in keeping them clean. The company has ten mixer trucks for hauling aged lime putty and concrete. Each day the trucks and mixers are given a thin brush coating of oil as an aid to easy removal of spilled concrete and putty.

The oil used is Corvus, a low-cost Texas Co. product, which is purchased in 55-gal. drums. Each mixer and all of the truck itself that is likely to be spilled on, including the fenders, cab and engine hood is painted with oil. It takes about ½ gal. per day per truck. At the end of each day all spillage and mud is easily washed off. Application of the oil keeps the trucks and mixers looking bright and polished and saves considerable repainting cost.

PLAN NOW TO ATTEND THESE BIG EVENTS ! ! !

1940 CONCRETE INDUSTRIES CONVENTIONS

National Concrete Masonry Association

★ Washington, D. C.—February 12, 13 and 14
Mayflower Hotel

One of the most important years in the history of the concrete masonry industry will be reviewed, and curtains will be drawn back for a view into the future. An outstanding program is promised.

. . . plus a trip to Florida, one of the most active markets for concrete masonry in the country, immediately after the convention. Many of your friends are planning to make this trip.

Cast Stone Institute

★ Washington, D. C.—February 12 and 13
Mayflower Hotel

Important plans are being formulated to make this one of the most important meetings in the history of the Institute. All manufacturers will find this a notable event.

American Concrete Pipe Association

★ Chicago, Ill.—February 15, 16 and 17
Palmer House

A program of outstanding value is promised for this meeting. The informal discussions of these meetings make them of exceptional and practical value.

American Concrete Institute

★ Chicago, Ill.—February 27, 28 and 29
Palmer House

A meeting place for concrete technicians, where fundamental problems are studied to improve current practices.

➔ **Join with others in the Concrete World as they get together to learn and to plan for future profits. Every event will be a real education.**

DON'T MISS THIS

MARCH ISSUE FEATURE

Complete Reports of all these meetings intelligently interpreted to assure maximum benefits for producers and equipment manufacturers alike.

CONCRETE PRODUCTS AND CEMENT PRODUCTS

The Complete Concrete House

Home of M. R. Warren, official of Southern Cast Stone Co., Knoxville, Tenn., serves to demonstrate all types of concrete masonry, including joists, slab floors, and cast stone fireplace

Tile of Lightweight

By BROR NORDBERG

M. L. White, right, president of Hollostone Co., North Hollywood, Calif.

STARTING on a small scale 15 years ago with the manufacture of the old-fashioned stone tile, M. L. White, president and owner of Hollostone Co., North Hollywood, Calif., has developed one of the largest concrete products businesses serving the Los Angeles area.

Residential construction, principally, and schools, theaters and churches take the bulk of the concrete masonry. Most exterior work is left exposed and practically everything is built of units 4 in. high, a size which architects prefer from the artistic approach and tradesmen like because of lightness in weight. A 4- x 8- x 12-in. unit is standard for ordinary wall construction.

Mr. White started in manufacturing "Supertile" with what he soon recognized as a clumsy method. This system retained the units in steel molds for initial set, giving a very true unit. But it was discarded as too costly to manufacture in any volume and too smooth for architectural treatment. Mr. White therefore developed his own machine to make the type of unit he wanted; a machine which had a low unit cost, a large capacity per man-hour, and a type of operation flexible enough to vary textures to suit requirements. Capacity of a single unit plant is 3000 (4- x 8- x 12-in.) units per day with a crew of only two men, which is equivalent to 150 sq. ft. of 8-in. wall per hour. The double unit (2 machine) plant at not much greater installation cost doubles production capacity.

His first "homemade" machine was built in 1937 but was displaced soon after with a vibrating machine made of electrically welded structural steel.

Uncrushed pea gravel and an unwashed plaster sand comprise the aggregates, plaster sand being preferred unwashed to retain some of the silt, which is a lubricant that makes the concrete more plastic in working a dry mix. To keep the water-cement ratio down, a concrete with practically no slump is used to manufacture units by vibration. Actual compressive strength of tile is between 1600-1800 p.s.i. gross area.

Aggregates are trucked to the plant, which is located on Lankershim Blvd., a main highway from the producing area. At the bins, a belt conveyor transfers aggregates into a measuring box ahead of a 14-cu. ft. Smith concrete mixer.

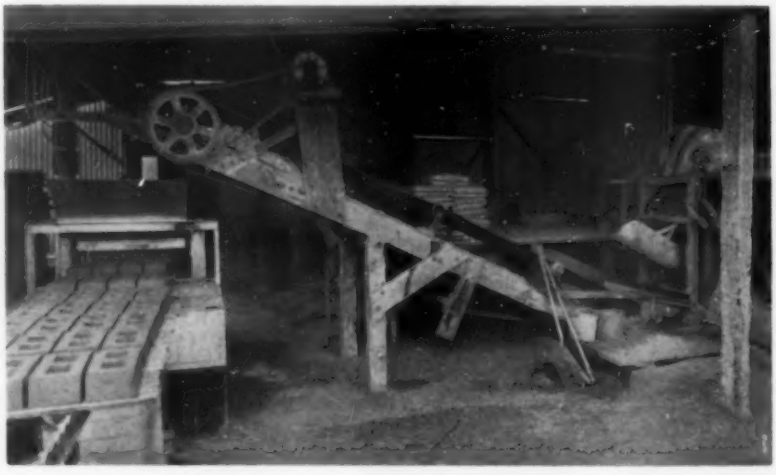
Manufacturing Methods

From the mixer, concrete is elevated by belt conveyor to a table hopper from which it is hoed into the mold. The concrete carrying conveyor is controlled by a switch at the mixer and also at the tile machine. Directly in front of the table hopper is the mold box, which has its top flush with the hopper bottom. Moving parts are a rotatable mold, a sliding stripper bottom and a lever latch. The mold box is 4- x 12- x 24-in., divided up to make three 4- x 8- x 12-in. standard units or equivalent in one operation, with one size pallet of wood serving for all unit sizes.

Above: Signboard at plant advertising concrete masonry to highway automobile traffic

Below—Fig. 1: Showing in order, from right to left, the concrete mixer, concrete conveyor, table hopper and units coming from machine on roll conveyor

The manufacturing cycle is as follows: After the operator fills the mold with the hoe, it is vibrated, the surplus concrete being returned to the hopper table by a strike-off blade. The pallet clamps are then set, holding the pallet on the mold, and a slight pull of the latch lever causes the mold to rotate 180 deg., putting the pallet on the down side of the mold. Pallet and tile together are stripped downward by a slight pressure of the hand assisted by starting the vibrating mechanism for a moment. A turn of the hand releases the pallet from the mold, and a slight push sends the pallet holding the tile to a continuous-chain, roll conveyor carrying the tile into yard storage. To complete the cycle of operation, the mold is flipped back to the filling position where it automatically locks and the process is repeated. The entire cycle, including the filling, vibration, mold rotation, extrusion of the pallet with tile and returning the



Surface textures are changed to suit customer by changing mix plasticity and varying aggregate proportions

Fig. 2: With concrete in the mold, operator is clamping on the pallet just before turning over mold

mold to the filling position, requires from 22 to 25 seconds. While the operator uses up a batch of concrete in the table hopper another mix is always in work, giving an actual mixing time of about 10 minutes.

Only moving parts on the machine are the mold, the sliding stripper bottom, and the lever latch, all operated without cams or gears. To change molds, the nuts on the pillow blocks are removed, the mold assembly is lifted off and another set on, requiring six minutes of one workman's time. The same pallets are used for all sizes of "Hollostone." Pallets are one inch boards with No. 24 gauge metal ends to prevent warping. A 2-hp. electric motor drives the off-balance shaft vibrator, and a ¼-hp. motor, the roll conveyor.

By varying proportions of the aggregates and changing the plasticity of the mix, surface textures are changed to suit architect's requirements, and he may be furnished any degree of roughness or irregularity. "Slump block," a familiar type of unit used in many Los Angeles residences, is a good example of how attractive a unit can be which departs from uniformity. These units are manufactured by changing the slump of the concrete in varying degrees. Actual height of standard units is 3⅝ in. to allow for a ⅜-in. mortar joint.

Curing is all done outdoors, the roll conveyor, driven through a speed reducer slowly conveying "Hollostone" tile the length of the storage yard. The roll conveyor is made up in sections for ready mobility to all parts of the area. Wet curing under burlap is followed by 28 days of air curing before delivery is made from the yard. Occasionally calcium chloride is used to expedite curing. About a half million tile are ordinarily kept in storage in a neat yard, well advertised by attractive large signs, telling the passing traffic the advantages of construction with "Hollostone" units.

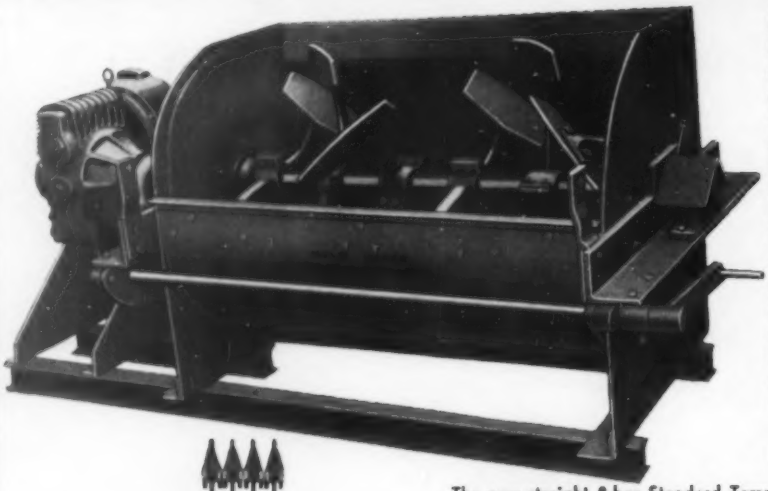
Sales Methods

Practically all residential construction using concrete masonry is exposed work, texture being an important consideration in dealing with the architect. Mr. White is personally active in dealing with architects and builders, makes extensive use of direct mail in promotion, and advertises in architects' magazines with local circulation. His range of activities is within a 100 mile radius, all tile being hauled in company-owned, flat-bed trucks. The Los Angeles Municipal Airport and the Beverly Hills High School are good examples of the high grade types of buildings being constructed of "Hollostone."

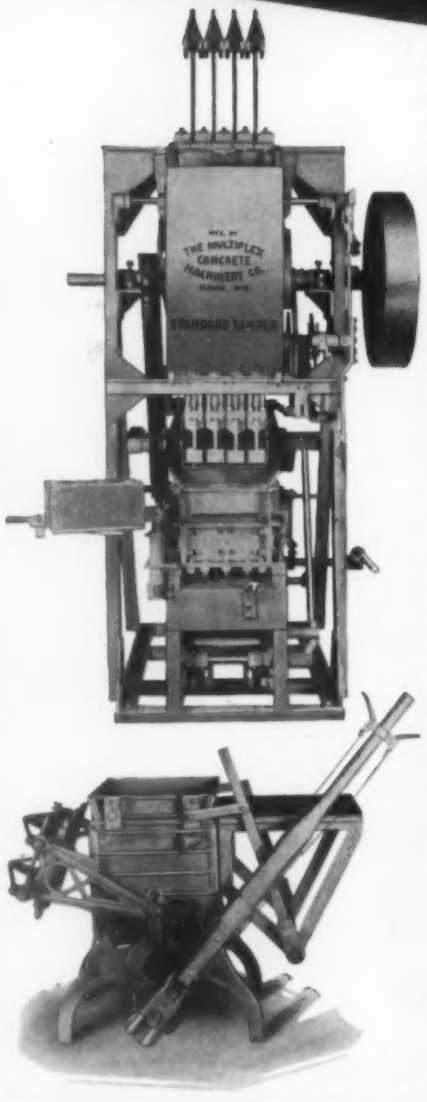
Since perfecting the new tile machine, Mr. White has started to build and market it commercially. Several Hollostone machines have been sold in the United States and some have been shipped to Panama and the Orient. These machines have been built in the company's shop adjoining the products plant. In fabricating his machine, Mr. White and his welder were winners of a cash award by the James F. Lincoln Arc Welding Contest, industrial machinery division, in a recently conducted national contest to stimulate scientific study of arc welding.

Top to bottom—Fig. 3: Rotating the mold box to put pallet on down side. Fig. 4: Stripping the mold by raising it from pallet. Fig. 5: Roll conveyor taking units from machine immediately after stripping

MULTIPLEX CONCRETE PRODUCTS EQUIPMENT
Designed to Serve Your Every Need



MULTI-MIXERS will give you a better mix at lower cost. This is the consensus of opinion of the many concrete products manufacturers who have installed them. The new design reverse paddle keeps material mixing twice as fast with less friction to liners. Mixes hard or light aggregate with equal ease and efficiency. Heavy roller bearings and simple design keep power requirements low. Paddles and mixing drum easily replaced. Equipped for either worm gear, gear drive, belt or V-belt drive—either end or side discharge. Built in the following capacities: 5-12-18-30-40-50 cubic feet.



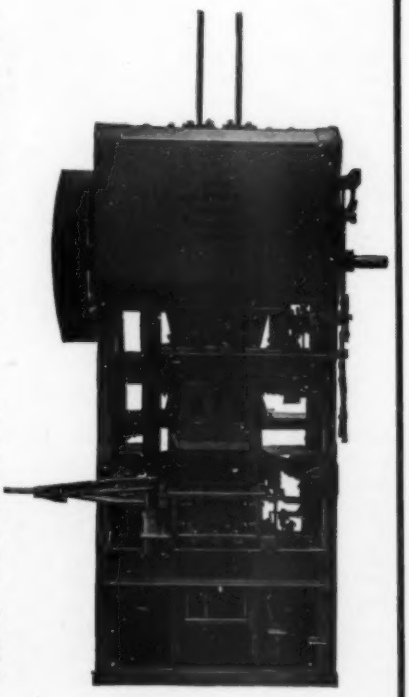
New 8-Bar STANDARD TAMPER

The new straight 8-bar Standard Tamper is the latest in design and construction and the time-feeding while tamping and the hopper agitation make better units. A production of from three to four 8x8x16" units per minute is assured with this machine. It can be had in hand or power stripping, and a smooth top is assured with our strike-off hopper.

SUPER TAMPER

This rugged machine is designed and constructed to produce better units at lower production cost. It is modern in every way. Patented tamp feet require less tamping and permit the use of a wetter mix. The patented feeder makes this machine readily adaptable for all kinds of aggregate. This MULTIPLEX quality machine will produce from 4 to 6 units per minute. Makes all standard sizes of block or tile.

The MULTI-VARIABLE vibration principle which enables you to quickly adjust the intensity of vibration to each product you make is an exclusive MULTIPLEX feature. Can be attached to all press machines, hand or power.



HAND VIBRATOR

The MULTIPLEX Lever Press Double Stripper with the attachment for variable speed vibration jolting, vibrates two 8x8x16", three 3x8x16", three 4x8x16", two 6x8x16", one 8x10x16" or one 8x12x16" block at one operation. The vibration is electrically controlled while filling and is released after filling, then hand pressure is applied to finish the top, making smooth or plain face blocks.

The Hand Lever Press is not new as it has been in use in plants without vibration for many years, and is still going strong. Now with vibration added to this time-tested machine, you can't go wrong.

Write for catalog describing our complete line of 20 models.

THE MULTIPLEX CONCRETE MACHINERY COMPANY

ELMORE OHIO

POROUS PIPE IS IN DEMAND

Carefully graded crushed stone aggregate gives concrete pipe maximum porosity and bearing strength

By **BROR NORDBERG**

A NEW DEVELOPMENT in concrete products is porous concrete drain pipe. This pipe, in which the entire wall is of porous construction, is competitive with pipe made of other materials that depend for porosity on perforations. It appears to be a product having potentialities for extensive use since drainage and irrigation are so important for airports, highways, athletic fields, foundations, farms, railroads, cellars, etc.

Berks Products Corp., Reading, Penn., is manufacturing and selling porous pipe in Eastern Pennsylvania as a licensee of the Smith Porous Drain Pipe Corp., Pittsburgh, Penn., originator of the pipe and manufacturer of the machine to make them.

Offers New Markets for Crushed Stone

Berks is a producer of crushed limestone, a large building supply dealer and has other interests, such as the retailing of coal and a trucking business. Crushed stone hasn't been buried among the other enterprises, but rather the company has actively sought for new markets for crushed stone and has been successful in doing it.

In 1927, the stone plant, of 100 tons hourly capacity, was built to produce railroad ballast and coarse commercial crushed stone for concrete aggregate. Since then there have been numerous changes. Many more grades of stone are produced and the company has an up-to-the-minute amiesite plant of 35 tons hourly capacity at the quarry. Then along came an opportunity to process and sell screenings by producing agricultural limestone, asphalt filler, concrete stone sand and masons stone sand. At one time concrete block were manufactured, but this part of the business was later sold. The two new developments are a batching plant in the quarry and the porous concrete drain pipe which are manufactured in the old concrete products plant building.

Producing Stone Sand

The pipe business, aside from its own merits, was added for two reasons; to use up part of the surplus of fines and to give winter employment to some of the men. Five men are needed to operate the plant.

Compression-stripper machine which manufactures porous concrete drain pipe at the rate of 150 per hour

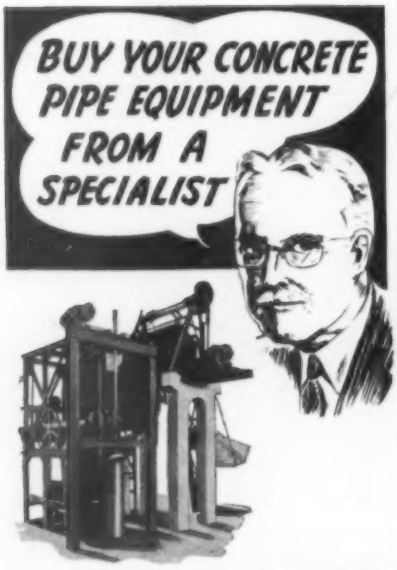
Method of handling porous concrete pipe from machine to rack

Manufacture of the porous concrete pipe is tied in with the manufacture of stone sand, which is graded dry over a 4- x 5-ft. Tyler Hum-mer screen. In producing the sand, this screen ordinarily has 0.206-in. sq. openings on the top deck and 0.113 in. on the lower deck to make a separation at ¼-in. and ⅛-in. for concrete sand and masons sand, respectively, with a feed of minus ⅜-in. screenings. Much of the throughs is crusher dust. In connection with the production of stone sand, the screen overs may be placed into a bin or reduced further by passage through 16-in. Williams rolls.

Grading of the aggregates is of utmost importance in the manufacture of a porous pipe that will have maximum porosity combined with bearing strength to meet rigid standards. Many gradings and combinations were tried, with plenty of breakage, before the proper combination was arrived at.

The successful aggregate is a definite combination of three gradings; ¼- to ⅜-in., the standard masons sand, and a fraction of the material retained between the two decks of the Hum-mer in producing the standard sands. It is obvious that the coarser screenings must predominate with just enough fines to make a paste that will have sufficient strength.

The coarse aggregate is graded uniformly between its upper and lower size limits. Masons sand is 100 percent through a ⅛-in. sieve, with 61 percent minus 20-mesh, 31 percent minus 50-mesh, and 19 percent through 100-mesh. The finest product blended runs as follows:



More than 16 years of specialized experience in the manufacture of concrete pipe equipment and concrete pipe has resulted in this "all-purpose" tamping machine which makes every size and type required in the average market. Large capacity with minimum operating costs assures real profits.

Write for bulletin.

UNIVERSAL CONCRETE PIPE CO.
Incorporated
COLUMBUS, OHIO

Percent passing	Mesh
99	No. 4
44	No. 8
4	No. 20
3	No. 50
2	No. 100

How Pipe Is Made

Definite amounts of each of these gradings are measured out in sacks directly from the bin spouts which are on the same level as the concrete mixer. Manufacturing equipment consists of a 21-cu. ft. Blystone type 4½ mixer and, directly below it, the compression-stripper pipe machine which is hand-operated.

The pipe machine manufactures either a 4- or 6-in. diameter pipe, each one foot in length. Capacity is 150 pipe per hour, making three in each operating cycle. Cores and pallets are interchangeable.

Manufacture of the pipe differs in many respects when compared with any other concrete products. The mix is dry and a longer mixing time is required than customary for other concrete products. Quick setting portland cements are not as satisfactory as the slower hardening types. Freshly-stripped pipe are very fragile and must be carefully handled on to the racks which are moved into curing kilns by jacklift trucks. Special semi-circular clamps have been developed to transfer them to the racks, and the trucks are carefully pushed into the kilns to guard against sudden shocks. The units are steam-cured 48 hours as compared to 24 for ordinary masonry units and pipe.

View of entire plant. Stone sand is made in the high structure to the right of the railroad track, and porous drain pipe in the lower structure to the extreme right

By having the entire pipe wall of porous construction, water permeates into the pipe almost instantaneously when they are placed. The pipe has no mortar joints but there is a snug tongue-and-groove fit to prevent entrance of roots, earth or other foreign matter, and to hold the pipe in alignment.

Demonstration box to show how fast porous concrete drain pipe drains off water poured on sod

A considerable amount of pipe manufactured in this plant has been used by the Commonwealth of Pennsylvania, Department of Highways, for highway drainage. The specifications for this application stipulated that the concrete be composed of one part portland cement to five parts of aggregate with a minimum wall thickness of 1-in. for 4-in. diameter pipe and 1⅛-in. for 6-in. diameter pipe. Minimum average supporting strength of 1600 lb. per lineal foot was required when tested to destruction. Minimum permeability was set at 10 g.p.m. for 4-in. pipe and 20 g.p.m. for 6-in. pipe.

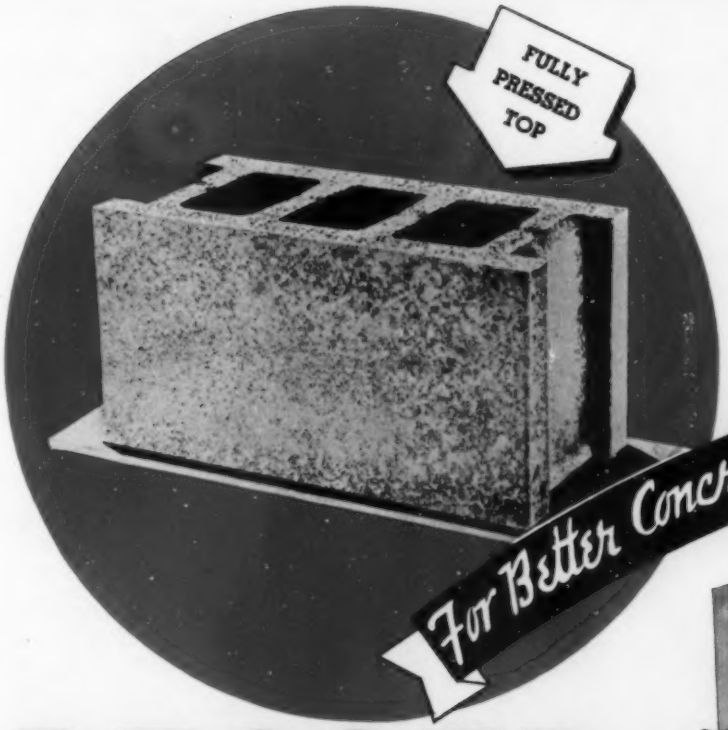
Plants Change Hands

E. J. GERKE AND SON, Merrill, Wis., has sold its concrete products plant to Harold Plass and LeRoy Neumann, who will operate as the Merrill Concrete Works. E. J. Gerke and Son will continue its excavating, grading and trucking business.

•

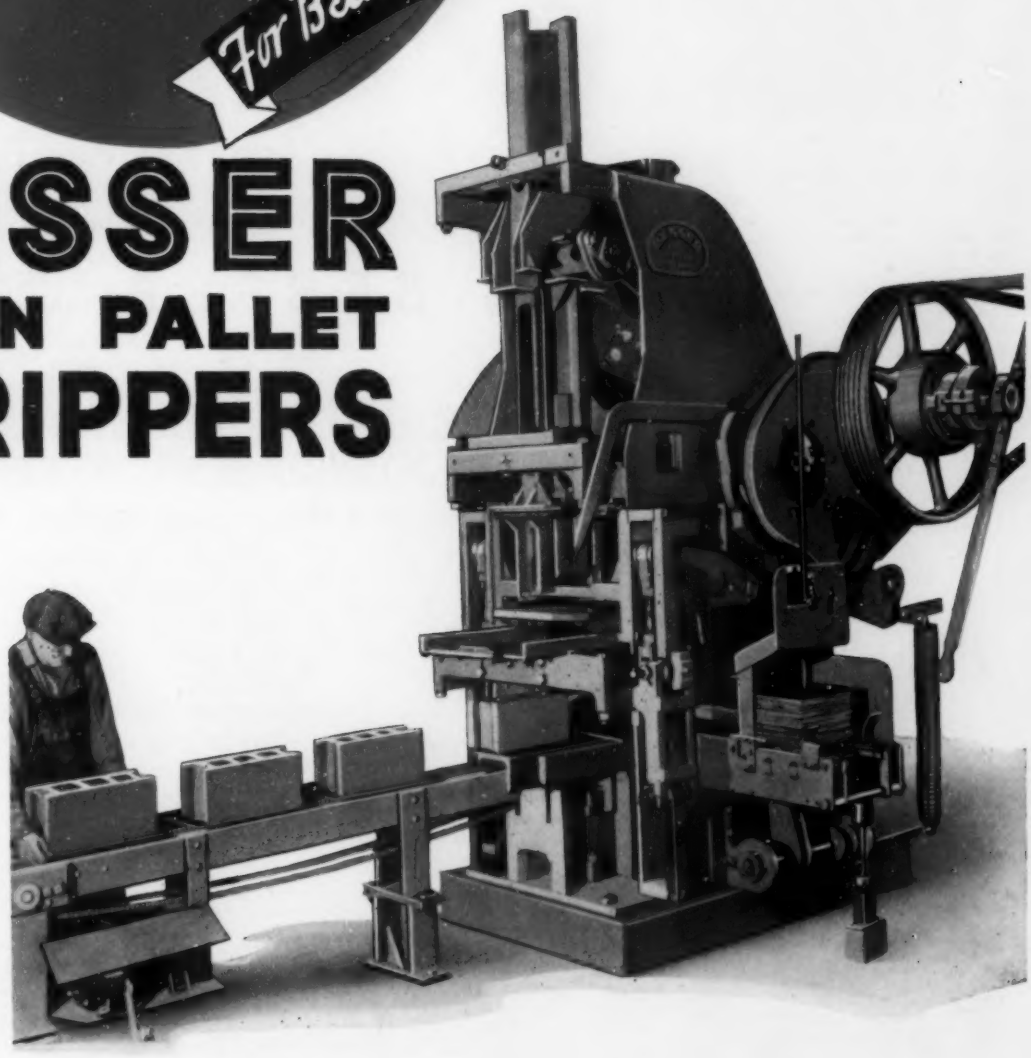
WALTER ANDERSON has taken over the Shivvers Sand and Tile Yard, Scandia, Kans., and will continue the production of concrete block, tile, and other units in addition to its sand and gravel business.

Amiesite road mix plant which is located near the quarry



For Better Concrete Masonry Units

BESSER
PLAIN PALLET STRIPPERS



BESSER SUPER AUTOMATIC PLAIN PALLET STRIPPER
with
AUTOMATIC PALLET FEEDER AND AUTOMATIC FRONT CONVEYOR

BESSER MANUFACTURING CO.

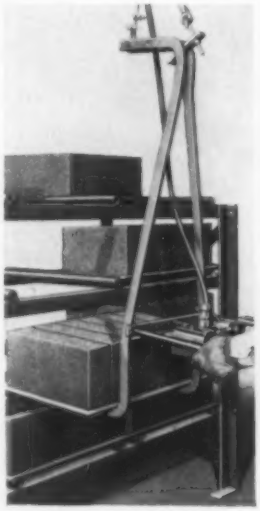
Main Office and Factory: ALPENA, MICHIGAN

BESSER

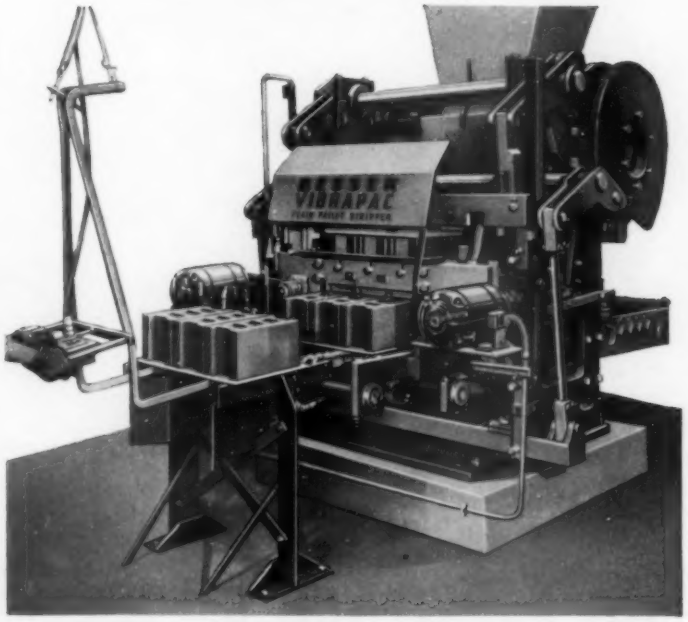
VIBRAPAC VIBRATION

The Newest PERFECTED and PROVEN Method of (1) Vibrating and (2) Packing Concrete Masonry Units with Fully Vibra-Pressed Tops

- Entirely different principle. Patent protection.
- **All** the vibrating done under pressure.
- Combined with use of Plain Pallets. Also patent protection.
- Uniformity and density controlled.
- Highest production machines made.
- 100% Automatic. Extremely simple.
- No machine operator required.
- Automatic Pallet feeding and oil spraying.
- One man electric offbearing device—no lifting.



Placing blocks on rack with electrically operated offbearing hoist.



BESSER SUPER VIBRAPAC PLAIN PALLET STRIPPER

Besser Super Vibrapac Plain Pallet Stripper capacity 600—8 x 8 x 16 blocks per hour. 8 x 8 x 16 blocks made 3 at a time on one Plain Pallet. Other sizes made in multiples on same set of pallets.

BESSER SUPER FULLY AUTOMATIC PLAIN PALLET STRIPPERS

The Most Simple Block Machines Ever Made

Makes all units with FULLY PRESSED TOP. Operates at a speed of 6½ molds per minute. Block machine including Automatic Pallet Feeder and Automatic Front Conveyor with 50 cu. ft. Batch Mixer and Skip Loader, assembled as a unit. Block machine and Mixer with Loader are operated with individual direct drive motors and Vee-flat Drives.

100% AUTOMATIC OPERATION

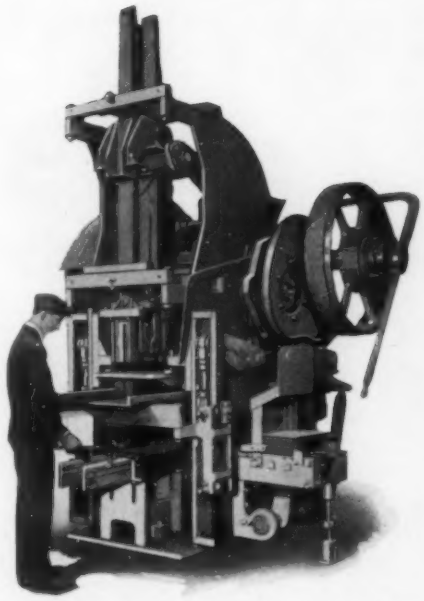
In the operation of any Besser Automatic Plain Pallet Stripper every movement is secured by simple cams working from a single revolving shaft. Once the clutch is engaged the machine needs no operator. Keep the Hopper supplied with material and remove finished units from machine or conveyor and production continues without a halt at the rated capacity.

The Stripper Head presses the top of the unit while it is being stripped, thus producing the FULLY PRESSED TOP, an original, exclusive feature inherent in Besser machines. The Fully Pressed Top quality is recognized by architects and builders and these units have a wide market demand.

Units 8 x 8 x 16 or larger are made one at a time. Smaller units are made from two to twelve at a time. Only one set of plain steel or wood pallets is required to make any size or type of building block, tile or brick.

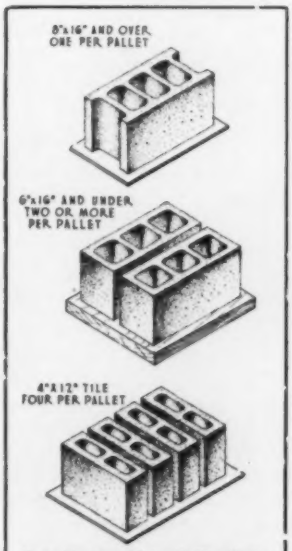
THE SAVING IN PALLET COST WILL PAY FOR A BESSER PLAIN PALLET STRIPPER

BESSER PLAIN PALLET STRIPPERS

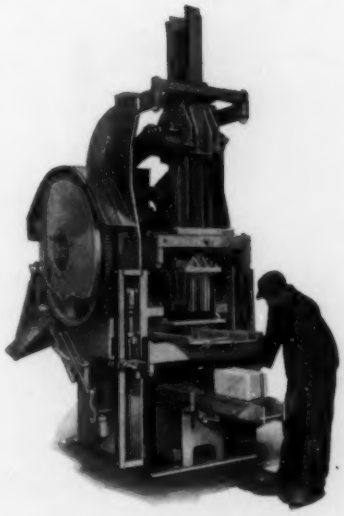


Besser Victory Fully Automatic Plain Pallet Stripper

Makes all units with FULLY PRESSED TOP. Operates at speed of 4½ molds per minute. The Victory is the same as Super except that the Super is heavier for faster speed. The Victory may be equipped with Mixer and Loader as shown on Besser Unitized Super.



Any Besser Plain Pallet Stripper Will Make All Units on One Set of Plain Pallets.



Besser Semi-Automatic Plain Pallet Stripper

Makes all units with FULLY PRESSED TOP. Operates at a speed of 3½ molds per minute. The Semi-Automatic is the same as the Victory but without automatic operation of pusher bars. The block is brought forward with an easy hand movement as shown in the illustration.

BESSER CHAMPION
Unitized Plain Pallet Stripper

Capacity—up to 1500 full size blocks per day. Power Tamping and Power Stripping with combined Power Feeding and Strike-Off, controlled with one hand lever and one foot pedal.

Twelve foot Besser Batch Mixer and Skip Loader assembled as a unit. Block machine and Mixer are driven by individual motors with Vee-flat Belts. All sizes and types of units are made on ONE SET OF PLAIN WOOD OR STEEL PALLETS. Wood pallets are commonly used with entire satisfaction. Wood pallets can be made locally from ordinary 1¾" lumber for only a few cents each.

Full size units are made one at-a-time. Smaller sizes are made 2, 3 or 4 at-a-time on one pallet. Solid brick are made 8 at-a-time on end on one pallet. Cored or frogged brick are made 4 at-a-time on one pallet.

Built for Strength and Endurance

EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

BESSER HAND OPERATED PLAIN PALLET STRIPPER

BESSER MULTI-MOLD

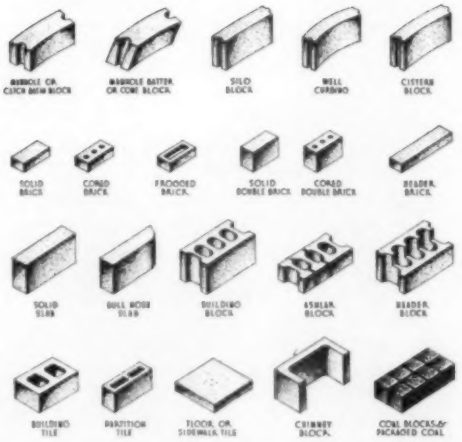
The Original Besser Hand Operated Plain Pallet Stripper with swinging tamper and Stripper Head combined.

Capacity—250 to 350 molds per day.

A strong, simple hand machine electrically welded into a solid unit. Will make standard hollow block and building tile, brick, solid or with cores or frogs. Also solid units such as manhole barrel and cone blocks, silo blocks, well curbing, slabs and many others.

Full size units are made one at-a-time on plain pallets. Small units made 2 at-a-time on one pallet. Cored or frogged brick made 4 at-a-time on one pallet. Solid brick made 6 at-a-time on one pallet. Either steel or wood pallets may be used. Wood pallets are commonly used. These may be made locally from 1¾" lumber for only a few cents each.

The right machine for small production or for short runs of odd sizes in larger production plants.



Above Units All Made on Multi-Mold

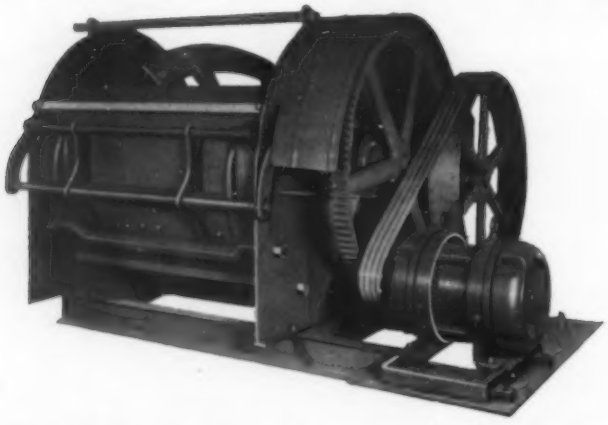
Only one set of either steel or wood pallets used to make all units.

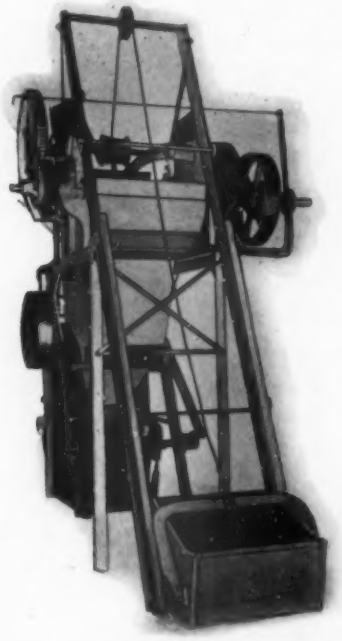
Plain steel pallets ¼ in. thick may be used, if desired.

Plain wood pallets 1¾ in. thick are more commonly used and are made for only a few cents each.

BESSER BATCHMIXERS

For Concrete Products Plants





BESSER SKIP HOIST

In All Standard Capacities—5, 12, 18, 25, 30, 40, 50 Cubic Feet. Original Besser Twin Spiral Blade Construction Gives the Most Thorough Mixing in the Shortest Time.

Besser Batch Mixers are the result of thirty-four years' experience in the manufacture and operation of concrete products plant equipment. They are sturdy, efficient and economical. They have proven successful under all conditions and with all aggregates.

BESSER MANUFACTURING CO. ALPENA, MICH.

Masonry Convention in Washington

Program of National Concrete Masonry convention comprises subjects of timely interest and practical value

WASHINGTON, D. C., the nation's capital, where so many examples of concrete masonry construction and cast stone applications may be found, will be host to the National Concrete Masonry Association and the Cast Stone Institute conventions February 12 to 14. Many attending will also desire to inspect some of the large, progressive concrete products plants in Washington and nearby cities. There will also be a boat trip to Florida following the convention.

On the first day, Geo. H. Krier will preside as chairman. Addresses will include, "The Work of the Cement Products Bureau of the Portland Cement Association—How you as a Concrete Masonry Unit Manufacturer Can Get the Most Benefit From It," by W. G. Kaiser, manager, Cement Products Bureau, Portland Cement Association, and "The National Concrete Masonry Association—Its Field of Usefulness to the Industry," by President Harve E. Kilmer. The afternoon session at the Bureau of Standards, will include the following subjects and speakers:

Greeting—Dr. Lyman J. Briggs, Director, National Bureau of Standards, Washington.

Loads on Building Walls and the Strength of Concrete Masonry Walls, Dr. A. H. Stang, Senior Engineer, National Bureau of Standards.

Water Permeability of Concrete Masonry Walls, D. E. Parsons, Chief, Masonry Construction Section, National Bureau of Standards.

Paints for Exterior Finishing of Concrete Masonry Walls, Mrs. Clara Sentel, Assistant Chemist, Paint Section, National Bureau of Standards.

Fire Resistive Dwelling Construction of Masonry, S. H. Ingberg, Chief, Fire Resistance Section, National Bureau of Standards.

Adjourn to fire resistance laboratory. Witness fire test of concrete masonry wall.

Evening—Grand Ballroom
Joint meeting with Cast Stone Institute.

Precast Concrete Floors

(Joint Session Monday night with Cast Stone Institute, W. G. Kaiser, presiding.)

A New Type of Precast Concrete Floor—Tee Sections are Used for Joist and Floor Slab or Joist and Ceiling Slab, by Ralph Condo, James Condo & Sons, Somerville, N. J.

The Flexicore Method of Precast Concrete Floor Construction, by H. L. Rogers, manager, Flexicore Division, Price Brothers Co., Dayton, Ohio.

Precast Concrete Joist and Precast Colored Concrete Slabs Offer a Wide Market, by A. H. Sexton, Stonex Products & Equipment Co., Miami, Fla.

Stocking Precast Concrete Joists and Cutting to Required Length is Now Practical, by Dave Warsaw, Hay-Con Tile Co., Detroit, Mich.

Increasing the Speed of Curing Precast Concrete Joists Through the Use of Electricity, by Joseph Nagy, Columbia Block & Supply Co., Toledo, Ohio.

Report of Committees.
Election of Officers.

Promotion Session

(Benjamin Wilk, presiding, Tues., Feb. 13.)

Housing In Our Time—A Motion Picture Prepared by the United States Housing Authority.

Concrete Houses Must be Made an Attractive Package to Command Public Acceptance—Outline of Activities in Pennsylvania Which Have Been Successful in Popularizing Concrete Houses, by A. H. Wagner, Housing and Structural Engineer, Portland Cement Assn., Philadelphia, Penn.

What the U. S. H. A. Housing Program Means to The Building Industry—The Task Accomplished and the Job Ahead, by Nathan Straus, Administrator, United States Housing Authority.

Adjusting Housing to Its Market—The F.H.A. Program in both Large Scale and Single Family Housing, by Stewart McDonald, Administrator, Federal Housing Administration.

The Federal Home Loan Bank Plan for Insuring Quality Construction for Residences, by John R. Fahey, Chairman, Federal Home Loan Bank Board.

National Cinder Concrete Products Association Meeting—Grand Ballroom—Hotel Mayflower.

Escorted Sightseeing Trip to Mount Vernon.

Annual Banquet, 7 p. m., Dinner-Dance and Entertainment.

Manufacturing Session

(President-elect presiding, Wed., Feb. 14.)

The Concrete Masonry Industry Tests Its Products for Strength and Durability. Tests Made at the University of Wisconsin—How to Interpret the Results and Apply Them to Plant Practice, by Paul M. Woodworth P.C.A., Chicago, Ill.

A New Type of Curing to Reduce Moisture Content of Concrete Masonry Units—The Use of Forced Air is a Promising New Development to overcome the Problem of Volume Change, by W. E. Barney, Hydraulic Press Brick Co., Cleveland, Ohio.

Study of the Handling and Stockpiling of Concrete Masonry Units in the Plant and the Yard, by Ezra Clark, president, Clark Tructractor Co., Battle Creek, Mich.

An Efficient and Inexpensive Covered Storage, by A. L. Bowling, Cinder Block, Inc., of Roanoke, Va.

Round Table Discussion of Manufacturing and Selling Problems.

Adjournment.
Escorted Sightseeing Trip.

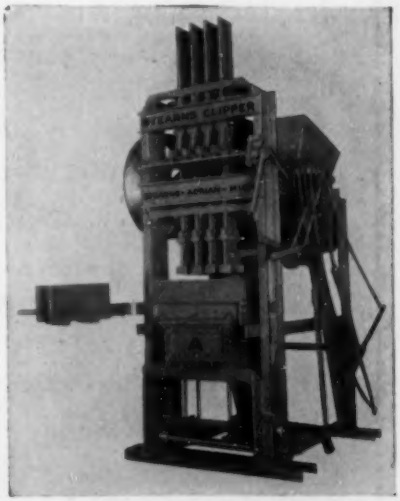
Concrete Pipe Concern Buys Property

KERR CONCRETE PIPE CO., Passaic, N. J., manufacturer of concrete pipe and concrete products, has purchased 12 acres of property with 1600 ft. railroad frontage in East Paterson, N. J. It is assumed that the property will be used in connection with the concrete products business.

Cement Colors

STAR and ANCHOR COLORS

Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.



"ANCHOR"

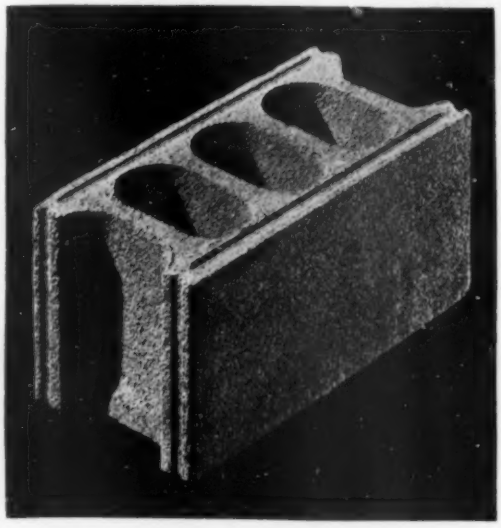
Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns Joltcrete, Stearns mixers, pallets, Straublox Oscillating attachments, etc.

Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

Anchor Concrete Mchy. Co.

G. M. Friel, Mgr. Columbus, O.



Only STEARNS JOLTCRETE blocks have been proven!

All your customers want vibrated blocks, because of the Stearns Joltcrete blocks they have seen. *There is a vast difference in different forms of vibration.* Only the Stearns Joltcrete Machine is licensed under the patented method by which the mold box is vibrated while the material is under pressure—*limited amplitude* vibration.

And only in the case of Stearns Joltcrete units, have vibrated blocks proven —by authoritative tests*—their higher early strength, lower absorption, less volume change and extremely light weight when made of light aggregates.

* See Wisconsin Test Results as reported in the Journal of the American Concrete Institute, Nov. 1939.

The whole significant history of vibrated concrete units in the last three years is a record of Stearns Joltcrete achievement.

Stearns introduced a new method and a new machine in 1938. At first received with doubts, Stearns Joltcrete in twenty-four months has won almost universal acceptance. Over a hundred Stearns Joltcretes have been bought. In 1939 more than fifty million Stearns Joltcrete blocks were made and sold.

■

If you want to offer your market a masonry unit of proven worth, install Stearns Joltcrete.

STEARNS
MANUFACTURING CO. - ADRIAN, MICH.

GENE OLSEN, PRESIDENT

MANUFACTURERS OF COMPLETE CONCRETE PRODUCTS PLANT EQUIPMENT

Block Machine With Adjustable Vibration

ADJUSTABLE VIBRATION is one of the interesting features of the small hand-operated concrete block machine recently announced by The Jackson & Church Co., Saginaw, Mich. The machine, known as the Vibr-Rite, is capable of making up to 900 blocks a day. It will handle sand and gravel concrete as well as the lightweight processed aggregates.

Operation is comparatively simple. After the mold box has been filled with material and vibrated, the feed hopper is pushed back, cutting and troweling off the top of the block. The mold box is then rolled over on to a plain pallet, stripped down and removed by off bearer. Rolling over and stripping action is counterbalanced to provide minimum effort in operation.

Vibration is imparted to the mold box by variable speed pulleys through V-belt drive, powered by a 1½-hp., high speed motor controlled by a foot switch at the front of the machine. It is high frequency, low amplitude vibration.

This unit is not only designed to fit into the plans of the small operator, but is said to be an economical addition to the large producer in the manufacture of special sizes and smaller quantities.

Making Concrete Pipe In South America

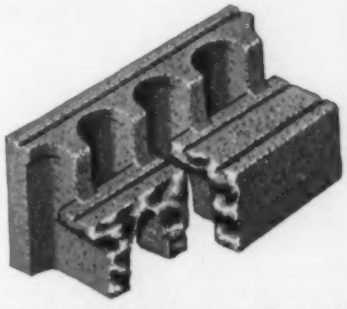
TWO VIEWS of the portable dual packer-head pipe machine and pipe being cured, operated by Zuloaga, Guinand & Co., Valencia, Venezuela, are shown in the illustration. This unit is manufactured by the Concrete Pipe Machinery Co., Sioux City, Iowa.

Both the machine and the mixer are mounted on a semi-trailer which is backed into a pit 9 ft. wide, 20 ft. long and 2 ft. 2 in. deep. Both the machine and the mixer are powered by a single Diesel engine. Pipe are cured under tarpaulin sun and wind protectors, equipped with casters, which permit moving them about the curing floor. No pipe is exposed until sundown the day it is made.

NEW DEVICES FOR CONCRETE UNITS

Header Block Easy to Lay

STEARNS MANUFACTURING CO., Adrian, Mich., has developed a header block which is made on Stearns Joltcrete machines, by the use of a special attachment, with no loose filler blocks to handle. It is made at exactly the same speed as regular blocks, and on the regular pallets.



Header block cut away to show stub core holes

As will be seen from the illustration, half cores extend the entire eight-inch depth of the block. Stub cores in the four-inch side of the block provide the desired air space but are closed at the top to provide full mortar bed for the brick. Longitudinal grooves in this bed assure maximum mortar bond.

Another development of this company is an assembly which may be attached to Stearns power strippers and Clipper strippers, having lever operated or power-operated strike-off, to convert the equipment into a machine making eight brick on end at each operation. The attachment

Brick machine attachment on block machine makes eight brick in one operation

consists of a mold box, tamp feet, hold-down assembly and compensating pallet support bars. There is an individual tamp rod for each brick, and all four sides of each unit are troweled as the brick are stripped. As the brick are not cored, plain wood or steel pallets may be used.

Gear-head motor drives have been introduced on Stearns concrete mixers in the 12, 18, 28, and 42 cu. ft. sizes. The speed reducer and motor are built in one protected unit, which may be mounted on either end of the machine. Pulley and V-belt drives are available on all models.

Left: Movable sun and wind protectors, to the left, pipe machine in background

Right: Close-up of dual packer-head pipe machine. Note rubber-tired buggies to transport pipe

Forum on Sales Manual for Ready Mixed Concrete

H. F. G. PELSUE was presiding officer at the final session of the 1940 convention. At this meeting the new officers were elected, an account of which appears on another page of this issue.

Practically the entire session was devoted to an open forum on the proposed sales manual for the ready mixed concrete industry which was advocated at last year's convention. Mr. Pelsue outlined the progress which has been made in the preparation of the manual. He said that in addition to the information it would afford the industry, the manual would inform others contemplating entering the business about its problems and difficulties.

Advertising

R. C. COLLINS of the Warner Co., who started the discussion of advertising recommendations for inclusion in the manual, believed that newspaper advertising in large cities is too expensive, except as part of an announcement concerning the completion of a large building project.

CHAS. P. MALONEY of Washington, D. C., said he did not advertise in newspapers, but did send out time books to contractors and foremen which served to advertise the company.

ROBT. MITCHELL of Consolidated Rock Products Co., Los Angeles, Calif., said his company had prepared a company manual and found it helpful. Display advertising is used in trade publications.

H. F. THOMSON of St. Louis gave his company's experience. For the first two years, informative publicity about the company and its production was used, but later personal contacts were depended upon.

STEPHAN STEPANIAN of Columbus reported that newspaper advertising was used, and pamphlets were enclosed in bills sent to sand and gravel customers. He also urged that a rather large insignia of the N. R. M. C. A. be painted on all trucks of members. Secretary Ahearn advised that the association would be glad to send out small cuts of the insignia to all members. Considerable discussion centered on the necessity for having clean trucks, attractively painted, as the best advertising the company could have. The use of a light, special oil is now used by several companies to facilitate the cleaning of trucks and preservation of the paint finish.

Trained Personnel

ALEX. FOSTER, Philadelphia, Penn., commented on the problem of having a trained personnel. Inspectors and those who operate plants are required by city code to be trained in the production of concrete mixtures. The Warner Co. also uses the teletype system at headquarters to transmit orders to the various plants. A "street man" is employed to check with contractors on their requirements. Mr. Mitchell said that his company in Los Angeles employs "concrete technicians" who service the job. Mr. Bird of Boston also found service men valuable in getting maximum use out of trucks.

On the question of advantages of ready mixed concrete, Mr. Thomson suggested adding the advantage of warm concrete in winter weather. Mr. Pelsue suggested the advantage of greater concrete placing capacity when using ready mixed. Mr. Collins stressed the price dependability for the contractor in figuring costs. Mr. Johnson said that the price problem is the most important in the industry. It was also mentioned by Mr. Stepanian that an efficient and pleasant truck driver helps to sell the product.

Prices and Costs

MR. PELSUE said that in securing an adequate price for ready mixed concrete, reference to satisfied customers is effective in selling skeptical contractors. Chas. P. Maloney, Washington, D. C., gave his views about pricing and methods of determining his costs. He said that his competition knows his price and there is no incentive for price chiseling. Truck mixer drivers, he said, are the real salesmen. It costs him $2.23 per cu. yd. to deliver concrete to the job, not including cost of materials. All truck equipment is leased, and sand and gravel is purchased. Mr. Stepanian said that his equipment also is leased. He is charged $1.00 per cu. yd. per mile for the first mile, and 15c per mile for each additional mile. Adding cost of material plus transportation, and then applying 30 percent for overhead and profit determines the price. Mr. Stepanian said he had 10 pricing zones. Mr. Collins, Philadelphia, Penn., told about the Warner Company's pricing policy which he said is determined by quantities to take advantage of carload handling economies. He said that his company is satisfied to secure a smaller number of jobs at a better price.

Standing Time Charges

On the question of charging for excessive standing time, Mr. McCracken said his company allowed 15 min. free time and charged the excessive at $3 per hr. Mr. O'Connor said a similar charge was made for excess time, but only about 40 percent of it was collected. Mr. Pelsue said that less than $100 was uncollectible on his company's charges, however, they give credit to the contractor for any savings on the standing time which is 30 min. These credits are only available on 3 cu. yd. loads. Contractors are paid $3 per hr. on credit allowances. Mr. Collins of Warner Co. said they charge $4.00 per hr. for standing time over 30 min. A minimum load is 3 cu. yd., and a charge of $1.75 is made for ordering smaller loads, except a finish load at the end of a pour or at the end of the day. Herbert Jahncke of New Orleans, La., asked Mr. Pelsue how he credited standing time saving, and it was explained that the saving was credited on the delivery record.

"Trials of the Concrete Order Clerk," a skit presented by four employes of Mr. Thomson's company in St. Louis, was very amusing and at the same time instructive. This concluded the ready mixed concrete convention program.

(Preceding convention program, pages 46 and 47)

Ready Mix Developments

CAMPBELL COAL CO., Atlanta, Ga., one of the oldest building material dealers in the South, recently placed an order for six 1½-cu. yd. Jaeger truck mixers, and is now in the ready-mixed concrete business.

•

J. P. O'CONNELL CO., Boston, Mass., one of the first ready-mixed concrete operators in the country, is modernizing its equipment. Recently six 4-cu. yd. Jaeger truck engine-driven transit-mixers were purchased.

•

CORNING BUILDING CO., Corning, N. Y., is building a batching plant for transit-mixed concrete, to be completed in March. Delivery of concrete is to be made in a 2¾-cu. yd. truck mixer.

Only JAEGER Offers These Advantages—

DRIVE FROM THE TRUCK ENGINE THRU SHOCK-PROOF TRANSMISSION VACUUM-CONTROLLED FROM CAB (or separate engine drive if desired).

DUAL-MIX DRUM produces higher strength concrete—as proved by the Hollister Tests.

THROW-BACK REVERSING BLADES—proved essential to a fast, thoro mix.

DUAL REVOLVING WATER SPRAYS spray to both ends of drum, insure faster, more uniform water distribution.

SYPHO-METER TANK insures accurate water control.

RUST AND ABRASION-RESISTING ALLOY STEEL—lighter, stronger, longer lived.

RECOGNIZED LEADERSHIP—more concrete is sold with Jaeger Truck Mixers than by any other method.

THE JAEGER MACHINE CO., Columbus, Ohio

SEND FOR YOUR COPY OF THIS 68-PAGE DATA BOOK FOR READY-MIXED PLANTS

Whether you are already operating a ready-mixed plant or planning to start one, you will find this book an invaluable guide and reference on modern truck mixer and agitator operation, compiled by the world's largest manufacturer—up-to-date, authoritative, complete.

THE JAEGER MACHINE COMPANY,
603 Dublin Avenue, Columbus, Ohio

Gentlemen:

We are interested in 1940 data on Ready Mixed Plants with Truck Mixers and Agitators, including set-up, operation, maintenance costs, selling of strength concrete, etc., as well as new developments in mixer design.

Name .....

Address .....

Designed by Robert Charles Martin

Another successful year for Fox Chase Manor . . . with CONCRETE again featured

Joshua M. Holmes, Jr., builder and developer, and Heyer-Kemner, Inc., realtors, again prove that greatly increased *business for concrete products and services* awaits picking off in residential market

Fox Chase Manor, just outside Philadelphia, made its initial bid for public attention by featuring *better construction* with firesafe, economical concrete.

52 houses were sold the first year, 46 more this year! And *eighty-five percent are concrete.* The basic sales price, including lot and landscaping, is $4,450 —a grand value for these attractive homes.

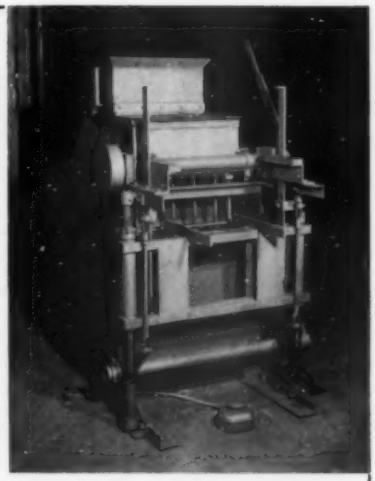
MORE DEMONSTRATION HOMES IN 1940—The experience of scores of concrete products manufacturers and concrete builders proves that you can profit by getting an architect to create a pleasing design . . . by tieing up with home builders or realtors in staging demonstration homes . . . and *featuring* the beauty, firesafety, long life and low upkeep of concrete in a hard-hitting sales and advertising campaign.

MORE FIRMS MAKING LOCAL TIE-UP—It will pay you to display truck and job signs; advertise in 'phone books, newspapers, by mail or radio; get salesmen following up the leads developed by the Association's national advertising that is reaching the best prospects in your community.

Steady, growing volume of residential business will come to the concrete products firms and concrete builders who pull together.

PORTLAND CEMENT ASSOCIATION
Dept. A2-45, 33 W. Grand Ave., Chicago, Ill.

Greater Profits — Lower Costs



THE KIRKHAM VIBRATOR

Makes Dense—Strong—Weather-proof Concrete Blocks

POSITIVE VIBRATION
COMPACT PORTABLE

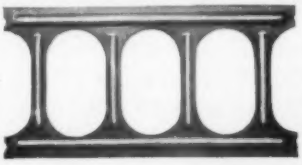
Economical Operation from Your Light Socket

Plain wooden or steel pallets.
Mold Boxes changed in a few minutes.

CONCRETE TRANSPORT MIXER COMPANY
630 ROSEDALE AVE. ST. LOUIS, MO.

COMMERCIAL PRESSED STEEL *"Close Clearance"* PALLETS

Will Not
BREAK
CRACK
WARP



Cost is low when life production is considered.

Made for tampers and vibrators.

Free air circulation, full rack car capacity, easy to handle, no excess weight to lift.

Strong—rigid—accurate core box fit.

Prospective block producers should carefully check their machine and pallet costs before investing.

Ask your equipment dealer or send for catalogue

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

QUALITY CONTROL INCREASES SALES

ONE OF THE MOST INTERESTING concrete products plants in the East is that of V. Paturzo, Bro. and Son, in Baltimore, Md. It has an annual capacity of nearly 2,500,000 blocks, and has attributed its rapid and continuous growth to its constant effort to maintain quality standards. The business is a family enterprise operated by Vincent, Antonio and Salvatore Paturzo.

Until last year all the products were made on tamping machines, but in the Summer of 1939 a Stearns No. 7 Joltcrete machine was installed. However, the plant continues to have a greater capacity for tamped units than for vibrated block.

Both cinder and gravel blocks are made. Material is delivered by truck and elevated to overhead bins which feed to two mixers, one on the manufacturing floor and one on the floor above. Two tamp machines are used in addition to the Joltcrete, the latter making blocks of the oval cored design. All products are subjected to steam curing for 24 hours.

Some very large jobs have been furnished with blocks, including Northwood Apartments, 300,000 units; Oaklee Apartments, 200,000 units; Bressler Memorial, 120,000 units; Samester-Parkway Apartments, 120,000 units; and Stansbury Manor, 200,000 units.

Concrete Brick Activities

QUARTZITE STONE CO., Lincoln, Kans., has been operating a concrete brick factory in Hutchinson, Kans., to fill a contract for 250,000 brick in the new post office. Hutchinson Supply Co. is furnishing the aggregates, the plant being operated on its property. Everett Thorney is superintendent and J. R. Carlgren is president of the Quartzite company.

•

J. C. CROCKER, president and general manager of the Crocker-Thompson Dunbrik Co., Inc., Charlotte, N. C., has announced that his company has plans to treble its capacity for the production of concrete brick. The company also makes stepping stones, flagstones and drain tile.

•

J. W. MAGNUSON CO., Denver, Colo., has expanded its concrete products business, and is now making concrete brick and cast stone. To produce light weight products, a volcanic ash aggregate is used. He also employs a special stone aggregate for products resistant to alkalis.

Cold Weather Concrete

SOLVAY SALES CORP., New York, N. Y., has published a new 48-page booklet, "Calcium Chloride and Portland Cement," containing detailed information on tests conducted by unbiased authorities with reference to the effect of adding calcium chloride to the concrete mix. Particular emphasis is placed on the protection it affords in cold weather; effects on workability, density and hardness; uniformity in curing. Copies are available without charge by writing the company direct.

Circular Promotes Cambered Shingle Tile

BASALT ROCK CO., Napa, Calif., has printed an attractive folder about Basalite cambered shingle tile. The folder opens into a three-leafed sheet. On the inside are close-up views of roofs laid with basalite tile and detailed illustrations to show the features of the tile, which are described in the text. There are also illustrations showing how the tile can be applied over old wood shingles. On the back side of the outer leaf, which must be viewed when the leaflet is opened and closed, are illustrations of three homes having the tile on their roofs and photographs of the tiles in their various colors. The back side of the middle section shows the Basalite plant exterior and some interior views.

Below: Vibrating block machine recently installed

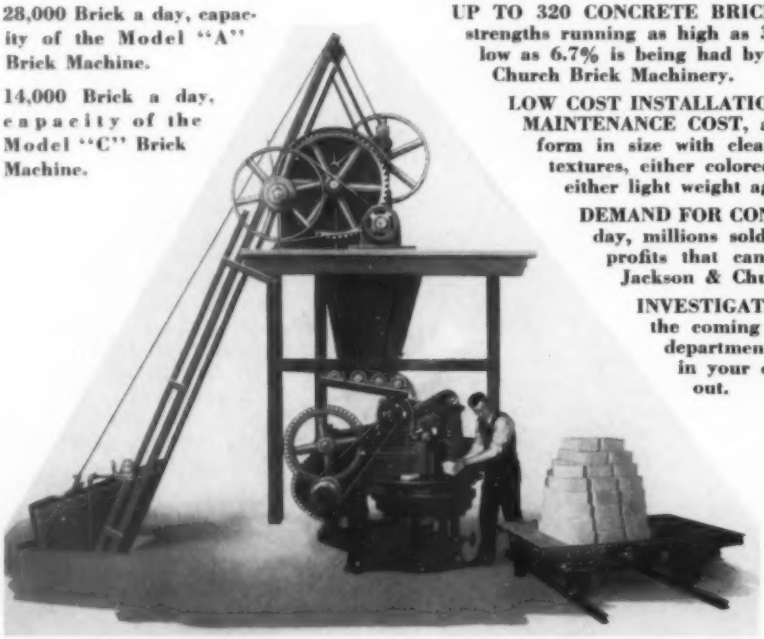
Above: Well-equipped concrete products plant, showing tracks to facilitate handling of blocks to yard and undercover storage to the left

"PRODUCTION SPELLS PROFITS"

THAT'S WHY JACKSON BRICK MACHINERY IS THE ANSWER

28,000 Brick a day, capacity of the Model "A" Brick Machine.

14,000 Brick a day, capacity of the Model "C" Brick Machine.



UP TO 320 CONCRETE BRICK PER SACK OF CEMENT with strengths running as high as 3700 lbs. p.s.i. and absorptions as low as 6.7% is being had by some producers using Jackson & Church Brick Machinery.

LOW COST INSTALLATION: NO PALLETS NEEDED: LOW MAINTENANCE COST, and producing brick that are uniform in size with clean cut, sharp edges and beautiful textures, either colored or plain. Will make brick from either light weight aggregates or sand concrete.

DEMAND FOR CONCRETE BRICK is increasing every day, millions sold every year. Let us show you the profits that can be had when making them on Jackson & Church equipment.

INVESTIGATE TODAY, get into production for the coming spring business. Our engineering department is at your disposal to assist you in your equipment selection and plant lay-out.

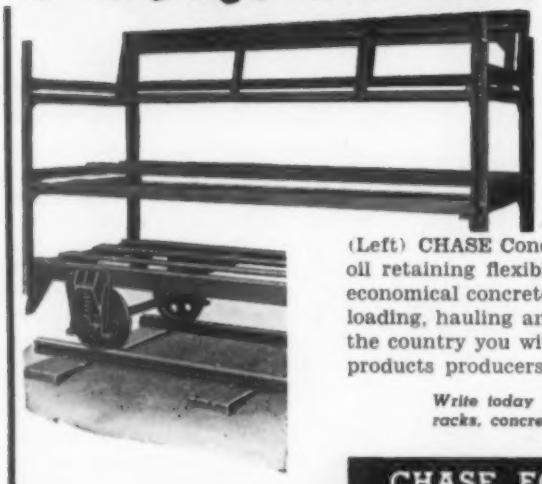
Since 1881

JACKSON & CHURCH CO.

SAGINAW, MICH.

CHASE DRYER CARS & TRANSFER CARS

for LOW INITIAL and LOW MAINTENANCE **COST**



ONE OF OUR MANY DESIGNS

(Above) CHASE all-steel Block Racks are built to suit your individual requirements. Our experience and engineering will give you a rack with the proper dimensions and arrangement for loading your product and the proper under clearance to work your lift truck.

(Left) CHASE Concrete Cars with Chase Patented Spring Bearings—dustproof, oil retaining flexible boxings with roller bearings—offer you the last word in economical concrete products handling equipment. They are designed to reduce loading, hauling and unloading time to the very minimum. In every section of the country you will find CHASE Equipment making extra profits for concrete products producers.

Write today for catalogs and low prices on our complete line of lift truck racks, concrete block cars, decks, transfer cars, turntables, dump cars, etc.

CHASE FOUNDRY AND MANUFACTURING CO.

COLUMBUS OHIO

Changes in Pallets

THE COMMERCIAL SHEARING & STAMPING CO., Youngstown, Ohio, has added to its line an 11¾-in. pallet. There also has been a change in the width of all the pallet sizes, 1/16 in. being added to make a little better core box fit.

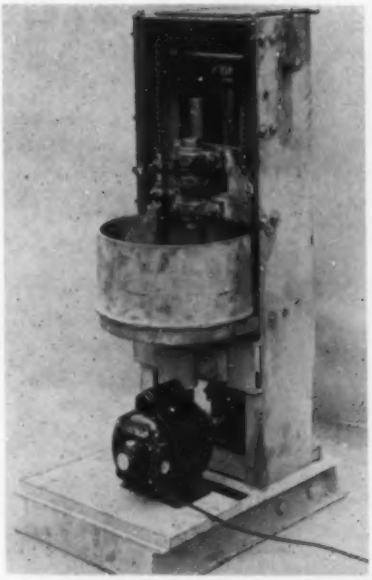
Announce Opening of New Waylite Plant

THE WAYLITE-SUPEROCK CO., Bethlehem, Penn., has announced that its new plant to produce a lightweight processed slag aggregate has been opened to serve the eastern states. The plant is located on the property of the Bethlehem Steel Co., and has been so designed that it can use the hot slag from any of the blast furnaces.

Counter-Current Mixer

EXPERIMENTS with different type concrete mixes has brought about a need for a small laboratory mixer. The Lancaster Iron Works, Inc., has designed their model PCA to handle a minimum batch of approximately one quart, with the batch size ranging upwards to a maximum of one gallon.

The mixing pan revolves in a clockwise direction at a speed of 17 r.p.m., while the mixing star, set off-center of the pan, revolves counter-clockwise at a speed of 67 r.p.m. The unit is furnished with a direct gear drive and ¼-hp. motor for operation.



Laboratory mixer handles up to one gallon

This laboratory unit weighs approximately 325 lb., stands 40 in. high overall by 15½ in. wide and 21 in. deep. The removable pan has an inside diameter of 12 in., and an inside depth of 5 in.

Fitting Company Name To the Business

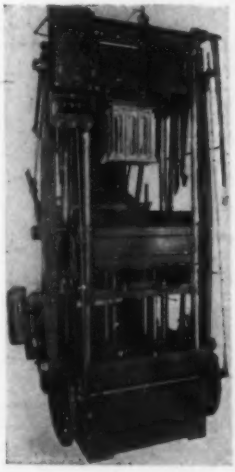
GRAYSTONE CONCRETE PRODUCTS CO. is the new name of the Concrete Pipe Co., Seattle, Wash., effective January 1, 1940. The new name was adopted because of recent expansion of the operations to include a variety of concrete products and to retain the trade name "Graystone Products" under which the company's products have been sold for years. The company was established in 1919 and is Seattle's oldest and largest manufacturer of concrete products.

Pipe Company Celebrates Silver Anniversary

WAUKESHA CEMENT TILE CO., Waukesha, Wis., recently celebrated its 25th anniversary, the oldest in Wisconsin. Starting with the manufacture of farmers' concrete drain tile, the company today makes pipe ranging from 4-in. to 72-in. The late E. M. Wilder, father of the present president of the company, J. H. Waite, established the company.

THE KENT-ROOT VIBRA-PRESS

THE PRECISION PRODUCTION BLOCK MACHINE FOR QUANTITY AND QUALITY REQUIREMENTS

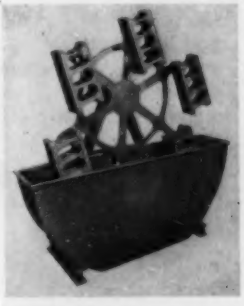


Vibration—Pressing—Uniform Density—Trowelled Surfaces—All these features combined in the KENT-ROOT VIBRA-PRESS make it THE OUTSTANDING CONCRETE BLOCK MACHINE OF THE YEAR.

Add to these—a range of units from 3 to 16 inches wide, any length up to 24 inches and any height up to 12 inches—a speed up to six 8x8x16 blocks per minute—the ability to stay on the job day after day, without any delay due to failure of the machine—then you can see why you too will install the KENT-ROOT VIBRA-PRESS. It will mean uniform blocks, maximum production, lowest upkeep cost and more PROFITS.

Make us PROVE IT! Write today for complete details.

THE KENT DUNKER



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THE KENT MACHINE COMPANY CUYAHOGA FALLS OHIO

Large Order for Ballast Rock

SAN GORGONIO ROCK CO., Banning, Calif., is now filling a large order for ballast rock for the Southern Pacific Railroad, according to E. M. Kirk, manager. The Southern Pacific is to use the rock for ballast in its track relocation and reballasting program between Banning and Yuma. About ten cars per day over a period of a year will be taken by the railroad. In addition to this contract, the San Gorgonio Rock Co. is completing its work in connection with the All-American Canal. Another contract received by this company from the War Department is for 4500 tons of sand and gravel for March Field. Plant mix and all grades of asphalt concrete are manufactured.

Universal Atlas Gets Large Contract

UNIVERSAL ATLAS CEMENT CO. has a contract from U. S. army engineers to furnish 282,000 bbl. of portland cement for construction on the Red River dam project near Denison, Texas. It is planned to manufacture all the cement at the Independence, Kan., mill.

Proposed Amendment to Lime Specifications

IT HAS BEEN ANNOUNCED by the National Lime Association that an amendment to the federal lime specifications is proposed. The following paragraph is to be added to Federal Specifications SS-L-351, "Hydrated Lime for Structural Purposes:"

The total free (unhydrated) calcium oxide (CaO) and magnesium oxide (MgO) in the hydrated product shall not exceed 8 percent by weight (calculated on the as received basis).

A method, based upon chemical analyses, for the determination of the free oxides is included in the proposed amendment. It is said that some of the federal governmental departments have already made this requirement a part of their specifications.

Spending $250,000 for Improvements

SOUTHWESTERN PORTLAND CEMENT CO., Los Angeles, Calif., will complete in March, 1940, improvements to its Victorville, Calif., plant costing $250,000. The improvements to the raw end include opening of a new quarry, construction of new loading facilities, installation of a new hammermill for crushing stone and changes to the elevating and conveying equipment. Other modernization involves the installation of two slurry tanks and thickeners, improvements in the packhouse, new dust collectors, clinker crushers and new devices for better control of burning in the kilns. John T. Bibb, Glendale, Calif., contractor, is doing all the installation work.

NEWS OF THE MONTH

Sand Company Mining Coal from River Bottom

MCCURDY SAND CO., Brilliant, Ohio, and its affiliate, the Tri-State Asphalt Co., Martins Ferry, Ohio, some time ago closed a lease with the Federal Government for nine miles of river dredging rights on the Ohio River which included coal rights. A survey showed a heavy vein of coal under practically the entire nine miles. Coal is being dredged out at the rate of 600 tons a day, according to a report. The vein is from 17 to 25 ft. thick.

Installing Air Separators

WABASH PORTLAND CEMENT CO., Osborne, Ohio, has purchased one 10-ft. and one 14-ft. air separators from the Universal Road Machinery Co. In addition to the new units, it is planned to modernize two 16-ft. air separators now in service.

Kansas Opens New Market for Lime

AMERICAN CARBIDE AND CHEMICAL CORP., Arkansas City, Kans., will build a new laboratory for research in industrial minerals. It is also proposed to build a new cyanamide fertilizer plant. Frank Webb, president of the company, announced in a letter to the Kansas Industrial Development Commission that sodium chlorate manufacture will call for large quantities of salt and lime. Rock wool manufacture is under consideration.

New York Sand and Gravel Producers Indicted

EIGHT sand and gravel producing companies, which are said to supply more than 60 percent of the sand and gravel used in metropolitan New York City, and eleven of their officers have been indicted by a Federal grand jury investigating the building construction industry. The inquiry was begun in November under the direction of members of the anti-trust division of Attorney General Frank Murphy's office. The Long Island Sand and Gravel Producers Association and William P. Jeffery, Greenwich, Conn., its secretary, also were named.

It was charged that the defendants began a conspiracy in September of 1938 to raise the wholesale prices of sand and gravel by large amounts. The effect, it was alleged, was putting into effect price schedules in January, 1939, raising the wholesale price of sand by 35 percent and the price of gravel by 20 percent over the market prices of the preceding month.

It was further charged that formation of the Nassau County Sand and Gravel Producers Credit Association was encouraged to "police" the industry against price reductions, made up of operators of inland pits. The defendants named, besides the

Barton Sand and Gravel Co., Baltimore, Md., uses Caterpillar Diesel engine to drive centrifugal pump with 8-in. intake to supply all water for washing. Plant capacity is 600 tons in eight-hour day

association, were the following: Metropolitan Sand and Gravel Corp. with W. A. Atkins, president; Seaboard Sand and Gravel Corp. with Anderson Dana, president; McCormack Sand and Gravel Corp. with W. J. McCormack, president, and John J. Bosch, vice-president; Land Improvement and Supply Co., Pittsburgh, Penn., with C. L. McKenzie, president; Gallagher Bros. Sand and Gravel Corp. with Peter C. Gallagher president, J. F. Murphy, vice-president, and J. Murray Gallagher, secretary-treasurer; O'Brien Bros. Sand and Gravel Co. and O'Brien Bros., Inc., with Joseph J. O'Brien, president, and Harold F. O'Brien, vice-president, Henry Steers, Inc., with J. Rich Steers, Jr., vice-president.

Perfect Safety Records in 1939

UNIVERSAL ATLAS CEMENT CO. had perfect safety records in 1939 at the Hudson, N. Y., Northampton, Penn., Universal, Penn., Duluth, Minn., Hannibal, Mo., and Independence, Kan., plants. This record of no lost-time accidents entitles each of the plants to a re-award of the Portland Cement Association safety trophy, which each plant has already received two or more times.

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LONE STAR CEMENT CORP., Hudson, N. Y., plant recently observed completion of its third perfect safety record.

Discontinue Operations of Lime Plant

LEHIGH LIME CO., Mitchell, Ind., discontinued operations the first of the year. The company was organized in 1902 and until a few years ago had employed an average of 85 men at the plant.

Shipping More Idaho Phosphate

ANACONDA COPPER CO., with phosphate plant at Conda, Idaho, has shipped more phosphate ore than for any previous year since operation of the mine was started. It is reported that 111,000 tons of phosphate rock were shipped from the mine during 1939. Much of the ore from the Conda mine is shipped to Butte, Mont., where it is treated with sulphuric acid, a by-product of copper ore smelting, to produce super-phosphate. For those who wish to try the untreated pulverized rock as fertilizer, the company plans to install machinery this spring for grinding the rock. It is said that this untreated phosphate dust will be put on the market at approximately $10 per ton.

From Gravel to Berries

BELLAMY SAND AND GRAVEL CO., Des Moines, Iowa, plans to reclaim the land at its Correctionville, Iowa, plant from which sand and gravel has been removed. As much as 2500 tons per day has been dredged from this deposit. In reclaiming the 15 acres, a dragline and tractor has been used to level the mounds of waste material and a layer of black top soil was placed over it. Alfalfa will be planted for two years to revitalize the soil, and then berries and corn will be planted.

Warehouse for Cement

PACIFIC PORTLAND CEMENT CO., San Francisco, Calif., is planning to build a warehouse and wharf on the west bank of the Sacramento River near Broderick in Yolo county. The company plans to transport cement by water from its Redwood City plant and use the warehouse for a distribution point. The company has a U. S. Bureau of Reclamation contract for delivery of 168,000 bbl. of portland cement to Sacramento.

Cement Statistics

BUREAU OF MINES reports that the portland cement industry in December, 1939, produced 9,488,000 bbl., shipped 6,772,000 bbl. from the mills and had in stock at the end of the month 23,495,000 bbl. Production and shipments in December, 1939, showed increases of 17.6 and 7.7 percent, respectively, as compared with December, 1938. Portland cement stocks at mills were 1.9 percent lower than a year ago. The preliminary totals of production and shipments for 1939 show increases, respectively, of 15.6 and 15.0 percent from the final totals for 1938.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 161 plants at the close of December, 1938, and 162 plants at the close of December, 1939.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	Dec. 1938	Nov. 1939	Oct. 1939	Sep. 1939
The month.....	36.9	43.3	52.1	57.2	56.3
12 months ended.	41.0	47.2	46.6	46.3	45.9

Open Indiana Quarry

MURHL R. SMITH, Montpelier, Ind., is establishing a new plant near the city for the production of commercial crushed stone and agricultural limestone. Mr. Smith was formerly associated with his father in conducting the business of the Rockledge Products Co., Portland, Ind.

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UNIVERSAL VIBRATING SCREEN CO.
RACINE — WISCONSIN

PRICES BID
Contracts Let

ST. LOUIS, MO.: Contract was awarded to William Houser, Inc., and Construction Materials Co., for ready-mixed concrete, each to furnish the city with 75 cu. yd. at $8.65 a cu. yd.

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CALEDONIA, MINN.: Agricultural limestone is being made available to farmers around Hokah at $1.25 per ton at the Charles Bolduan quarry or $1.50 per ton delivered in a six-mile radius.

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LICKING, MO.: Texas County farmers are being furnished agricultural limestone by Erwin Lanning at $1.55 per ton delivered on the farm and spread for an additional 40c per ton.

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VIRGINIA, MINN.: Coons Co., Hibbing, Minn., submitted a low bid of $1.70 per cu. yd. for 3000 tons of gravel to be used on city WPA projects.

CHATFIELD, MINN.: Roverud Brothers of Spring Grove were awarded a contract for 2000 cu. yd. of crushed stone at 77c per cu. yd., and Fred Fakler of Sugar Loaf was awarded a contract for 5000 cu. yd. at 80c per cu. yd.

•

SHADYSIDE, W. VA.: Universal Concrete Pipe Co., Columbus, Ohio, has been awarded a contract to furnish 1750 ft. of 24-in. concrete sewer pipe at a cost of $1.15 per ft. and 500 ft. of 12-in. concrete sewer pipe at 31.8c per ft.

The HELTZEL TRUCK MIXER CHARGING PLANT

•

Heltzel BUILDS IT BETTER

- BINS, Portable and Stationary
- CEMENT BINS, Portable and Stationary
- CENTRAL MIXING PLANTS
- BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
- BITUMINOUS PAVING FORMS
- ROAD FORMS (with lip curb and integral curb attachments)
- CURB FORMS
- CURB AND GUTTER FORMS
- SIDEWALK FORMS
- SEWER AND TUNNEL FORMS
- CONCRETE BUCKETS
- SUBGRADE TESTERS
- SUBGRADE PLANERS
- TOOL BOXES
- FINISHING TOOLS FOR CONCRETE ROADS

A fast—accurate—dependable truck mixer charger developed to meet today's increasing demands for ready mixed concrete. Furnished in any capacity with compartments for 3 or 4 aggregates and cement for either wet or dry batches — these plants meet all specifications. Write for complete information. Heltzel built-in quality insures life-time satisfaction.

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO • U. S. A.

Permanente Again Low Bidder

THE PROCUREMENT DIVISION of the Federal Treasury Department opened bids from four California cement manufacturers on 100,000 bbl. of cement for an unnamed destination. Permanente Corp. was low bidder on the cement at $1.19 a bbl., followed by Calaveras Cement Co. at $1.22, Yosemite Portland Cement Corp. at $1.245 and Santa Cruz Portland Cement Co. at $1.25. Calculation of mill base prices, plus transportation charges to the point of destination, will determine which bid is to be accepted.

Open Cement Bids for Tucumcari Project

THE PROCUREMENT DIVISION of the Treasury Department received bids from five cement companies on 47,000 bbl. of modified portland cement to be used by the U. S. Reclamation Service on the Tucumcari project in New Mexico. Bids, f.o.b. mill, net price per bbl., follow: Southwestern Portland Cement Co., El Paso, Texas, $1.40; Colorado Portland Cement Co., Portland, Colo., $1.7216; U. S. Portland Cement, Portland, Colo., $1.7216; Monolith Portland Cement Co., Monolith, Calif., $1.30; Monolith Midwest Portland Cement Co., Laramie, Wyo., $1.50.

Investigate Feldspar in Illinois Sands

ILLINOIS STATE GEOLOGICAL SURVEY, Urbana, Ill., is making a study of the feldspar content of glacial sands in Illinois. While conducting other studies recently it was found that there are considerable deposits of sands having a feldspar content of 10 to 25 percent. A number of factors, including a commercial method of separation and the determination of composition and purity, are being investigated to determine whether or not such Illinois sands can become commercial sources of feldspar.

FREE ! New Literature

THE bulletins and catalogs described below are for your benefit. To save you the necessity of writing individual letters, those you want can be obtained by merely checking and mailing the post card on this page.

1 ABRASIVE CUTTING MACHINES. — Andrew C. Campbell Division of American Chain & Cable Co., Inc. No. 302 cutting machine catalog includes illustrations of machine set-ups for regular and special jobs, plus concise information, specifications and descriptions of the machines offered.

2 ALLOY TUBES.—Babcock & Wilcox Tube Co. Technical bulletin 12-A, Condensed Technical Data on High-Temperature Steels, contains revised information and technical data on B & W seamless alloy tubes and pipe for high pressure and high temperature services.

3 BELTING.—Audubon Wire Cloth Corp. Catalog No. 50-78 shows numerous types of metal conveyor and processing belts available in any ductile metal most resistant to various operating conditions. Illustrated are weaves, meshes, and wire diameters for drainage, grading, classification, etc.

4 COMPRESSORS. — Chicago Pneumatic Tool Co. Bulletin 767 describes and illustrates the new CP Class W-CO, Diesel-driven two-stage air compressors which consist of a double-acting, water-cooled compressor on a common crankshaft and base. Available capacities are 662 to 2000 c.f.m. for pressures of 80 to 125 lbs.

5 CONCRETE BLOCK MACHINE. — Kent Machine Co. The Kent-Root Vibra-Press, its general construction, principles of operation and features are detailed in a clearly written bulletin.

6 CONVEYING EQUIPMENT. — Robins Conveying Belt Co. Bulletin 109 briefly describes and illustrates the complete line of Robins equipment.

7 CRANES.—Cleveland Crane & Engineering Co. Form G-237 describes the operation and application of the complete line of Cleveland cranes and conveyors and is profusely illustrated with views of the units in operation.

8 CRUSHER, IMPACT. — Pennsylvania Crusher Co., Bulletin 6000 is about the Pennsylvania Steelbuilt Reversible Impactor, its principle of operation, its features, the kind of aggregates it breaks, and the nature of the reduced material.

9 CRUSHER, DOUBLE ROLL.—McLanahan & Stone Corp. Catalog DR-31 contains a detailed explanation of the McLanahan double roll crushers and a number of illustrations showing them in operation and partially disassembled.

10 DIESEL CONVERSION UNITS. — A. J. Alsdorf Corp., has issued a bulletin about the Buda-Lanova Diesel engine models, designed to replace regular V-8 gasoline engines in Ford trucks. Features of the engine are explained and specifications are included.

11 DIESEL ENGINES. — Hercules Motors Corp., has issued a question and answer type booklet, comparing construction, operation and care of Diesel and gasoline engines and also of two-cycle and four-cycle Diesel engines.

12 DIESEL ENGINES.—Caterpillar Tractor Co., has issued a number of bulletins containing specifications and other details for various models. Known as Form 1823, 115B is about the 34-15 Diesel electric set; 116B, the 44-20 Diesel electric set; and 120A is about the 46-30 Diesel electric set.

13 DIESEL ENGINES.—International Harvester Co. "The Why and Wherefore of the Diesel Engine" gives in concise form the origin, development, advantages, design and construction of the Diesel engine and its application to International products.

14 DREDGE LADDER.—Eagle Iron Works, has issued a booklet giving complete information on the general operation and features of the Eagle "Swintek" screen nozzle ladder, which is a traveling chain type of screen nozzle ladder, the chain acting as a traveling screen over the nozzle of the suction pipe line.

15 DRILLS.—C. Kirk Hillman Co., has issued a bulletin containing a detailed description and many illustrations of the Hillman "placer special" drill, a churn drill designed to produce a remarkably sharp, snappy drilling action, but at the same time with a smooth, vibrationless performance.

16 DRILLS, ROCK.—Ingersoll-Rand. Form 2600 presents the new Oil-Ir air-line lubricator for automatically maintaining the proper amount of lubrication in rock drills.

17 DUST COLLECTORS.—American Blower Corp., has issued a booklet presenting data on the Type D dust collector, in which the proportions and design follow exactly the action of the air in a natural cyclone, down to a tailpiece where terrific suction is present to separate dust and clean air.

18 DUST COLLECTOR. — Prat-Daniel Corp., has issued a bulletin describing and illustrating the Thermix tubular dust collector, a variation of the Thermix multicyclone, designed for limited space requirements.

19 DUST COLLECTORS. — Westinghouse Electric & Mfg. Co. Bulletin B-2157 contains a detailed description supplemented with explanatory illustrations of the Precipitron electrostatic dust collecting cell and its principal of operation.

20 EXPLOSIVES.—Atlas Powder Co. Catalog No. 9 contains information about the entire line of Atlas explosives and necessary blasting accessories, telling what to use for best results.

21 DRILL RIGS. — The Cleveland Rock Drill Co. Bulletin 311 is profusely illustrated with views of the Cleveland DR8 drill rig in action and the many positions in which it operates. This model features a new recoil device to hold the machine consistently to its work.

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22 FURNACE LININGS.—Ironton Fire Brick Co. has issued a bulletin describing the application of its plastic refractory, Nojoint, the ease with which it can be applied, and its resistant qualities.

23 ELECTRIC SHOVEL AND DRAGLINE. —Bucyrus-Erie Co. Bulletin D-1007 is about the improved Bucyrus-Erie 100-B, 4 cu. yd. electric shovel and dragline. Among the features explained in this 32-page bulletin are a new welded front-end construction, Ward-Leonard control, powerful digging action and big operating range.

24 MATERIAL HANDLING. — Stephens-Adamson Mfg. Co. Volume 184 of The Labor Saver contains descriptions of several installations of interest to aggregate producers. Among these are a West Coast aggregates plant and a combination aggregates and batching plant for a new dam.

25 MATERIAL HAULAGE. — Dempster Brothers, Inc. Bulletin 501 contains a complete description as well as numerous action views of the line of Dempster-Dumpsters. The many views show the variety of uses for this unit.

26 PALLETS. — Commercial Shearing & Stamping Co. has brought out a new catalog giving specifications, features, and diagrams of their block pallets.

27 POTTSCO LIGHTWEIGHT AGGREGATE.—Celotex Corp., has issued a bulletin on performance tests on Pottsco lightweight aggregate concrete masonry units with particular reference to the effect of gradation of aggregate, method of curing, and age of units on compressive strength.

28 PULLEYS. — Rockwood Manufacturing Co. has issued booklet 860, covering all types of Rockwood paper pulleys, including types for special conditions.

29 SCREENS.—Simplicity Engineering Co. Bulletin No. 39 presents the features and details of operation of Simplicity gyrating screens.

30 SCREENS.—W. S. Tyler Co. Bulletin 908, "New Developments in Wet Screening," contains information on various units in the Tyler line of screens and features of their operation.

31 SHOVEL, CRANE AND DRAGLINE.—The Thew Shovel Co., has issued a bulletin describing the 1¾-cu. yd. Lorain 80. Operation of the unit as a shovel, dragline, crane, clamshell or backdigger under varying conditions is illustrated.

32 SHOVELS.—Bay City Shovels, Inc. Catalog 18-A describes and illustrates Bay City Model 18 truck shovel-crane of ¾-cu. yd. capacity with 16½ ton crane rating, and catalog 55-B contains illustrations, details of construction, specifications and working ranges of Model 55 equipped with 1 cu. yd. buckets and with crane rating of 15 tons.

33 SPRAY NOZZLE.—Link-Belt Co. Folder 1632 describes and illustrates applications of the Link-Belt non-clogging spray nozzle, a smoothly-polished, curved bronze deflector with a U-bolt for clamping it securely to water pipe.

34 TRUCK MIXERS.—T. L. Smith Co. Catalog 198 contains detailed information on the complete line of Smith-Mobile truck mixers and agitators. The text stresses eleven features of this unit.

35 TRUCK MIXERS. — Concrete Transport Mixer Co., has issued a bulletin describing the features and operation of its transport mixers. Also included are numerous illustrations of the units in action.

36 TRUCKS. — Marmon-Herrington Co., Inc. Form 391031 presents the complete line of medium and light weight All-Wheel-Drive units. In addition to the description and illustrations of the various models are many action views of them being used where their greater traction makes possible heavier operation.

37 V-BELT FASTENERS.—Flexible Steel Lacing Co. Bulletin V-200 covers a new line of Alligator V-belt fasteners for "B," "C," and "D" section V-belts. It illustrates various types of applications where endless V-belts could not be used without costly dismantling of the drives or use of fasteners.

38 V-BELTING.—Gates Rubber Co. The December issue of Industrial News contains an article on the economies resulting from the application of Gates Vulco V-belts to all drives at a Missouri silica plant.

39 WEARING PARTS. — Taylor-Wharton Iron and Steel Co., has issued a bulletin presenting the Tisco wearing parts for suction and ladder dredges: pump parts, cutter heads, suction pipe and elbows, dragheads, etc.

40 WELDERS. — Allis-Chalmers Mfg. Co. Bulletin No. B6049 is about the Weld-O-Tron, a low current electronic welder for precision work which can be used to weld with currents as low as 5 amperes, using specially developed small welding rods.

41 WELDING ELECTRODES. — General Electric Co. Bulletin GEA-1546F is on the selection of GE arc-welding electrodes. It also gives important suggestions on welding technique with different types of electrodes, contains characteristics of deposited weld metal, charts of joint forms and positions and a handy estimator for electrode quantities.

42 WELDING ELECTRODES. — Harnischfeger Corp. has issued a catalog about the complete line of Smootharc welding electrodes. Included is data on the use, sizes, and application of each type.

43 WIRE ROPE.—Macwhyte Co. Bulletin 39-50 is about the new Macwhyte "K" monel, "Z" nickel, or stainless steel wire ropes, which are reported to be obtaining excellent results in withstanding corrosion, sustaining tensions, and absorbing impacts.

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37	38	39	40	41	42	43		

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Company .....

Street .....

City & State .....

Valley Forge Improvement

VALLEY FORGE CEMENT CO., West Conshohocken, Penn., shut down on January 1, for the purpose of completing an extensive modernization program. Preliminary crushing and air separator equipment is being installed in the finishing department to improve fineness and insure higher surface areas. Changes are being made in the kiln-room to improve operating conditions and reduce fuel consumption. Modifications of the flow-sheet and additions to the equipment of the flotation plant will enable this unit to meet the present and proposed specifications for low-heat, sulphate-resistant and other special cements. In general, the new flow-sheet is designed to recover both quartz and calcite, but to discard alumina and magnesia-bearing minerals.

Concrete Pavement Yardage

AWARDS of concrete pavement for December, 1939, and for the calendar year of 1939 have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during Dec., 1939
Roads	3,259,889
Streets and Alleys	1,691,160
Airports	77,176
Total	5,028,225

Type of Construction	Total sq. yds. during year 1938	1939
Roads	36,900,856	29,726,526
Streets and Alleys	18,315,916	19,214,396
Airports		886,003
Total	55,216,772	49,826,925

Sand Lime Brick Production and Shipments

NINE active sand-lime brick plants reporting for December and eight for November, statistics for which were published in January.

AVERAGE PRICE FOR DECEMBER

	Plant Price	Delivered Price
Detroit, Mich.	....	$14.50
Milwaukee, Wis.	$10.00	12.00
Mishawaka, Ind.	11.00	....
Saginaw, Mich.	10.90	....
Seattle, Wash.	14.50	16.50
Syracuse, N. Y.	14.00	16.00 C/L 20.00 L/C

STATISTICS FOR NOVEMBER AND DECEMBER

	†November	‡December
Production	1,540,700	1,506,390
Shipments (rail)	185,000	42,000
Shipments (truck)	1,627,950	1,583,110
Stock on hand	855,559	1,660,619
Unfilled orders	430,000	250,000

† Eight plants reporting: incomplete, one not reporting production, three not reporting stock on hand, and four not reporting unfilled orders.

‡ Nine plants reporting: incomplete, one not reporting production, two not reporting stock on hand, and five not reporting unfilled orders.

This FLEXOMOTIVE Uses 70c Worth of Fuel a Day

• In actual use, on tough jobs, the Plymouth FLEXOMOTIVE above works a continuous 8-hour day on 14 gallons of 5c fuel. Its extra heavy slab frame construction keeps maintenance costs DOWN. Write for details of the FLEXOMOTIVE'S operating economy, versatile performance!

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Division of Fate-Root-Heath Co.
PLYMOUTH, OHIO

Plymouth FLEXOMOTIVE
GIVES YOU *EVERYTHING* YOU WANT IN A LOCOMOTIVE!

150 tons per hour are produced by this Universal Gravel Plant in Nevada, in use 5 years. Right: 30-Q, one of 50 types of Universal Quarry Plants, economizes for Illinois operator.

PROOF!

There's proof aplenty, if you want it, of the year-after-year economy, efficiency and high capacity of Universal Rock and Gravel Crushers and Pulverizers and Stationary and Portable Plants; proof that Universal's bearings and other design and construction features cut crushing costs by eliminating shut-downs and replacements, and by providing consistently high output at lowest cost per yard of finished product.

Write for new catalog and *proof*

UNIVERSAL CRUSHER COMPANY
617 C Ave. West, Cedar Rapids, Iowa

UNIVERSAL

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Alpha Portland Cem. Co.	$ .25	Mar. 25
Canada Cement Co., Pfd. (arrears Nov. 30, $32.75)	1.25	Dec. 20
Lehigh Portland Cem. Co.	.37½	Feb. 1
Lehigh Portland Cem. Co., pfd.	1.00	Apr. 1
Pacific Portland Cem. Co., pfd. (arrears Dec. 31, $39.25)	1.00	Jan. 25
Riverside Cem. Co., pfd.	1.50	Feb. 1
Schumacher Wall Board Corp., pfd.	.50	Feb. 15

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INDUSTRIAL SILICA CORP., Youngstown, Ohio, reported through L. M. Hansen, president, that while the first eight months of 1939 showed an operating loss of $3000, it appeared that for the full year of 1939 the company would have a profit of about $70,000, against a loss of $16,000 for 1938. During the year, the washery at the company's storage plant was rebuilt at a cost of $75,000, paid for out of current funds. The company recently paid $50,000 on the refunding notes issued in June, 1939, leaving a year-end balance outstanding of $450,000. Further payments will probable be made early in 1940.

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CANADA CEMENT CO., LTD., Montreal, announced the following comparative income account for the years ending November 30, 1938 and 1939:

	1939	1938
*Operating profit	$3,978,203	$3,551,996
Depreciation	1,250,000	1,250,000
Admin. exp., etc.	127,748	127,977
Bond conv. exp.	110,000	110,000
Balance	2,490,455	2,064,019
Bond interest	592,507	616,882
Mtge. interest	27,300	36,625
Income taxes	395,000	286,000
Net income	1,475,648	1,124,512
Preference divs.	1,004,345	1,305,649
Surplus for year	471,303	d 181,137
Prev. surplus	2,107,812	2,288,948
Surplus, 11-30	2,579,114	2,107,812
Times int. earn.	4.02	3.15
Earn. pref. share	$7.35	$5.60
No. of pref. shs.	200,869	200,869

* Includes investment income: 1939: $56,848; 1938, $46,984.

•

ARUNDEL CORP., Baltimore, Md., has reported a net profit of $385,484 for the three months ended September 30, 1939, as compared with $388,905 for the like period in 1938. Nine months' net profit amounted to $1,063,298 in 1939 as against $1,035,905 in 1938.

•

SUPERIOR PORTLAND CEMENT, INC., Seattle, Wash., reported $845,570 net profit for 1939. In 1938, net profit was $257,661. Unfilled orders at the end of the calendar year were 1,078,000 bbl., which compares with 1,476,000 bbl. a year ago.

•

FLORIDA PORTLAND CEMENT CO., Tampa, Fla., reports a net profit of $459,331, before federal taxes, for the twelve months ended September 30, 1939 as compared with $234,565 for a similar period in 1938. Net sales were $1,726,251 for the period as against $1,390,444.

•

SOUTHERN PHOSPHATE CORP., Baltimore, Md., reports a net income of $81,384 for the ten months ended October 31, 1939. This compares with $188,651 for the year ended December 31, 1938. Net sales for the ten months in 1939 were $805,258 as compared with $854,893 for the entire year of 1938.

CUT THE COST OF READY MIXED CONCRETE

Buy the Truck Mixer with These

REXCLUSIVE FEATURES

1. Rex Man-ten Cone-End Mixing Drum—gives 100% thorough mix without need of "throw-back" blades. Positive, end-to-end mixing action.
2. Rex Positive Shock Absorbing Flexible Chain Drive—better than 98% efficient! Far lighter, far more shock absorbent than any gear-type drive in the business!
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5. Rex Automatic Overflow Water Tank—with new Rex Nozzle Closers. 100% foolproof, discharging into center of drum through one nozzle!

Ask About the Rex Time Payment Plan

Now you can buy Rex Moto-Mixers and pay for them as the money comes in! Send today for complete details about the Rex time payment plan. Ask for catalog, too! Address the Chain Belt Company, Dept MM-2, 1649 W. Bruce Street, Milwaukee, Wisconsin.

BUY REX-MOTO MIXERS AND BE RIGHT!

NEW HAVEN TRAP ROCK CO., New Haven, Conn., in a report as of November 30, 1939, showed total assets of $3,461,114 as compared with $3,373,431 for the same date in 1938. Total current liabilities on November 30, 1939, were $46,322 as against $62,969 on November 30, 1938.

•

SUPERIOR PORTLAND CEMENT CO., INC., Seattle, Wash., had a net profit of $845,570 for the year ended December 31, 1939, as compared with $257,661 for the calendar year 1938. Unfilled orders as of December 31, 1939, were $1,078,000.

•

NATIONAL GYPSUM CO., Buffalo, N. Y., is reported to have had in 1939 the best business and highest profits in its history. While final figures are not yet available, indications point to a net profit for 1939 equal to around 95c a common share, after preferred dividends. This compares with 49c a common share in 1938. For the nine months ended with September, 1939, net of $1,216,044 was equal to 80c a common share.

COMING CONVENTIONS

American Institute of Mining and Metallurgical Engineers, Engineering Societies Building, New York City, February 12 to 16.

National Concrete Masonry Association, National Cinder Concrete Products Association, and Cast Stone Institute, Mayflower Hotel, Washington, D. C., February 12, 13, and 14.

Sand-Lime Brick Association, Hotel Pennsylvania, New York City, February 12 and 13.

American Concrete Pipe Association, Palmer House, Chicago, February 15, 16 and 17.

American Concrete Institute, Palmer House, Chicago, February 27, 28 and 29.

National Concrete Burial Vault Association, Netherland Plaza Hotel, Cincinnati, Ohio, May 7, 8 and 9.

CONSOLIDATED CEMENT CORP., Chicago, Ill., has advised holders of 15-year first income 6s and income 6% notes that interest of 3% will be paid on February 1, 1940, upon presentation of coupon No. 10 from bonds and notes to the trustee for the respective issues. Continental Illinois National Bank & Trust Co., Chicago, is trustee for the bonds and First National Bank, Chicago, is trustee for the notes. On January 22, 1940, the company announced that certificates for 15-year income 6% note scrip and class A stock scrip will become void for all purposes after May 1, 1940. Note scrip certificates aggregating $20 or more in principal amount of notes may be surrendered in exchange for notes. Notes will only be issued in denominations of $20, $100, $200, $500, and $1000. Stock scrip certificates aggregating one or more full shares of class A stock may be surrendered in exchange for full shares of class A stock.

•

LONE STAR CEMENT CORP., New York, N. Y., announced the following statement of earnings for the final quarter of 1939 and for the year ended December 31, 1939:

3 mos. to Dec. 31:	1939	②1938
Sales	$5,360,216	$5,026,820
Costs & expenses	3,811,147	3,464,656
Deprec. & depl.	574,689	696,493
Operating profit	974,380	865,671
Other income	66,543	59,050
Total income	1,040,923	924,721
Fed. taxes, etc.	274,179	269,589
①Misc. charges	cr 162,495	cr 84,336
Net profit	929,239	739,468
Year to Dec. 31:		
Sales	$21,221,799	$20,458,971
Costs & expenses	13,906,856	13,675,341
Deprec. & depl.	2,669,346	2,792,817
Operating profit	4,645,597	3,990,813
Other income	222,161	209,011
Total income	4,867,758	4,199,824
Fed. taxes, etc.	1,080,895	989,704
①Misc. charges	380,704	308,336
Net profit:		
March quarter	586,058	726,237
June quarter	923,661	797,134
Sept. quarter	967,202	805,585
Dec. quarter	929,239	②739,468
Year	$3,406,159	②2,901,784

① Includes provisions for doubtful accounts and contingencies.
② Revised.

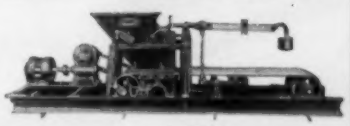
•

EASTERN MAGNESIA TALC CO., INC., Burlington, Vt., had a net profit of $35,524 in 1939 compared with $19,761 for the calendar year 1938.

•

UNITED STATES GYPSUM CO., Chicago, Ill., will have a net income for the year ended December 31, 1939, of over $7,000,000, according to a report prepared by Dow, Jones & Co. This would bring 1939 net income near that of 1937 when the company had a net of $7,538,508 or $10.10 a share on the 691,198 shares of common stock.

PROPORTION BY WEIGHT



WITH POIDOMETERS

Many cement plants are using Poidometers for proportioning raw and finish materials, and also cement and hydrated lime for Masons cement. Poidometers are also being used for feeding materials to grinding mills, and coal to dryers. The Poidometer is self-contained. The scale beam is graduated in pounds or kilos, and can be set at whatever amount of material may be required per foot of belt travel; the gate is then adjusted to suit this weight, and the machine will deliver the pre-determined amount of material with an accuracy of ninety-nine per cent.
Poidometers can be mounted on trucks for moving from one bin to another if desired.

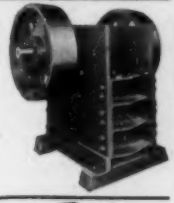
Write for Catalog No. 2 and get complete profit-producing facts!

Schaffer Poidometer Co.
2028 Smallman St. PITTSBURGH, PA.

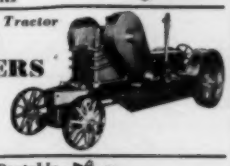
"Established in 1885"

ROADS whether mountain or farm to market under any condition
you can depend on
GRUENDLER EQUIPMENT
(FREE—Write for our 16 page Catalog and Specifications)

JAW CRUSHERS
Bronze or Roller Bearing
Heavy armor plate steel or cast steel.
Heavy Duty Construction
Large capacity
Small power Requirements



Self Traveling Tractor
JAW CRUSHERS
Ideal for maintenance road work



Stationary or Portable
HAMMER CRUSHERS
Wide crushing range, crushes stone 2½" down to agriculture dust.
Ideal for Farm to Market Road Work
Portable 2 in 1 Hammer Crushers

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NEWS ABOUT PEOPLE

J. W. CAMPBELL has been appointed superintendent of the Catskill, N. Y., plant of North American Cement Corp., to succeed G. A. Witte. S. H. Rhodes, formerly assistant superintendent of the Howes Cave, N. Y., plant, succeeds Mr. Campbell as superintendent of this plant. John L. Hurley has been appointed district sales manager at Washington, D. C., to succeed W. E. Hannan, Jr., who has been appointed district sales manager at Albany, N. Y.

•

A. E. FORSTER has been appointed assistant general manager of the explosives department of Hercules Powder Co., Wilmington, Del., and A. R. Ely succeeds Mr. Forster as manager of the service division of the explosives department.

•

SAMUEL M. SHALLCROSS, of the American Lime and Stone Co., Bellefonte, Penn., and GEORGE C. HOLTON, American Cyanamid and Chemical Co., New York City, who knew each other as boys of 8 and 6, respectively, some 40 years ago in Delaware, met for the first time since then at the National Crushed Stone Association convention at St. Louis. Otho M. Graves introduced them to each other; and when they got into conversation it was discovered that it was a renewal of a 40-year old friendship.

•

PAUL A. MORI, works manager of the Cleveland Quarries Co. at Amherst, Ohio, has been promoted to vice-president in charge of mechanical operations of the Cleveland Quarries, Ohio Cut Stone Co. and all properties and will move to the company's general offices in Cleveland. He knows the company from the bottom up, having started working for it in 1911 as a laborer.

•

W. W. DEADMAN, superintendent of the Lone Star Cement Co. at Bonner Springs, Kan., has been transferred to the Norfolk, Va., plant as superintendent.

JOHN H. MALLON has been appointed sales manager of the Louisville Cement Co., Louisville, Ky., to succeed Eugene D. Hill, who was recently elected president of the company. Mr. Mallon has been associated with the Louisville company since graduation from Yale University in 1919 and has been assistant sales manager for the past several years. Assistant to him will be Homer T. Baker, for the past ten years a field representative of the company.

John H. Mallon

•

FRANK E. NABERS, JR., has resigned as sales manager of the protein division of the Glidden Co., Cleveland, Ohio, to become general manager of the Gager Lime Co., Sherwood, Tenn.

•

WALTER W. ZEIGLER has been elected president of Standard Concrete Products Co., Inc., York, Penn., to succeed his father, James A. Zeigler, who after twenty years as president is retiring from active business. Mr. Zeigler will also continue as general manager. The other officers that were elected are: Charles B. Wolf, vice-president; Navin D. McWilliam, secretary; George H. Wolf, treasurer.

•

STEPHEN STEPANIAN, Arrow Sand and Gravel Co., Columbus, Ohio, has been elected a director of the Marble Cliff Quarries Co., which owns all the stock of the Arrow company.

•

OTHO M. GRAVES, president of the General Crushed Stone Co., Easton, Penn., has been chosen chairman of the committee on Government Relations to Industry of the National Association of Manufacturers. As its name implies this is, under present conditions, about the most important committee of the N. A. M. Less than three years ago Mr. Graves was elected a director of the N. A. M. to represent trade association groups. It is very gratifying to his many friends in the crushed stone industry to observe how rapidly his exceptional ability as an organizer and presiding officer has been recognized by the top-notch executives of American industry. Mr. Graves is a past-president of the National Crushed Stone Association and was chairman of the Code Authority for the Crushed Stone, Sand and Gravel and Slag Industries during NRA days. Very few men in any industry have had a broader experience or have a broader point of view on the relations of government to industry.

•

FINDLAY S. DOUGLAS, formerly special representative in New York of the Universal Atlas Cement Co., New York, N. Y., has been appointed assistant to the president. Prior to joining Universal Atlas he was manager of motor and generator sales of Sprague Electric Co., now Sprague Division of General Electric Co.

•

BURT H. BEVERSTOCK has been promoted to the position of sales manager of the Standard Portland Cement Co., Plainesville, Ohio. He has been in the company's sales division since it was instituted.

•

DR. CHARLES M. A. STINE, vice-president of E. I. du Pont de Nemours & Co., Wilmington, Del., was presented with the Perkin Medal for "valuable work in applied chemistry" at a meeting in New York City, January 12. The medal is an annual award made by the American Section of the Society of Chemical Industry.

(Obituaries appear on page 91)

New Method of Dewatering and Classifying

By RAYMOND DULL*

WHEN ONE is confronted with the knowledge of the many devices for dewatering or classifying sand or other materials, he is apt to conclude that the inventors have pretty well covered the field.

The interesting series of articles by the experienced and able engineer the late Mr. Edmund Shaw, which have been appearing in ROCK PRODUCTS the last several months, gives some idea of the extent of this development.

The writer had an idea one day which seemed so very simple that the first impression was that there must be something wrong with it. However, curiosity was too strong and a sheet metal model was made and the scheme tried out. The next step was to find out how it would work in a plant. This was done with most satisfactory results. Then came the decision to market it.

Fig. 1 shows a longitudinal section of a steel tank of the sand separator, and Fig. 2 is a cross section of the tank through its middle. The conveyor, when driven as shown from the foot end, permits the belt to slack down and follow the bottom of the tank, carrying the sand up the inclined trough and out of the water.

You have undoubtedly walked along a beach near the water and noticed how firm and hard the sand looked. That is how it appears on the belt.

Fig. 2 shows the belt supported on wearing strips which have a two-fold purpose, taking the wear from the bottom of the tank, thus providing space for introducing lubricating water to reduce friction, and washing any sand from beneath the belt.

One of the largest belt manufacturers says that as the belt runs slowly in water and there is very little friction it will not heat up and long life may be expected. They also call our attention to the splendid service of rubber bearings used in dredges where water and sand contact the bearings.

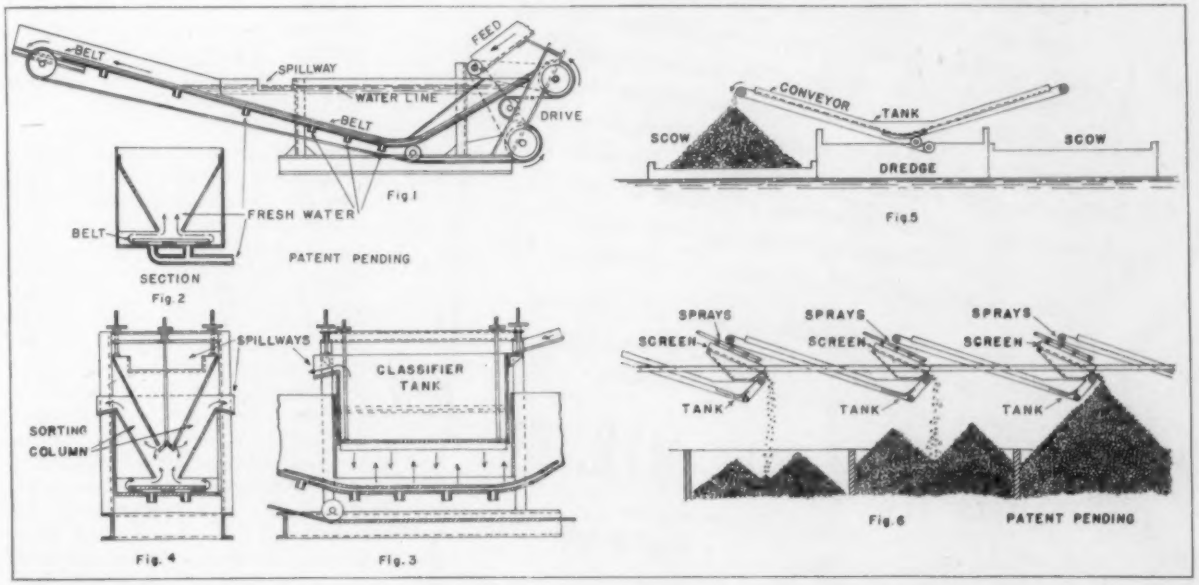
Figs. 3 and 4 show another interesting feature of the invention which is the introduction of a wedge-shaped tank within the dewatering tank, converting it into a classifier. The sand is carried into the upper tank, the excess water goes out the spillway and the V-valve at the bottom causes the sand and water to flow down into the dewatering tank in two long thin streams. The space beween the tanks forms a sorting column which carries over the lighter sand and permits the heavier sand to drop on the belt. The sorting is regulated by raising or lowering the upper tank, which varies the velocity of the water in the sorting columns and its sand carrying capacity.

Another means of regulation is the change of the quantity of water under the belt which adds to the upward current. A machine is required for each size of sand desired.

It will be seen that as the finer sands are separated less water remains with the sand with each operation, because the spillway of each classifier tank takes out some of the water and makes the separation easier.

This machine is not limited to dewatering sand, but will dewater a conglomeration of sand and gravel as delivered by a dredge pump. Fig. 5

*Raymond Dull, the inventor of the new dewaterer and classifier, will be remembered by the old-timers as the manufacturer of the Dull screen, later taken over by Link-Belt Co. He is now planning to start the manufacture of his latest invention.



Applications of dewaterer and classifier. Fig. 1: Shows longitudinal section of sand separator tank. Fig. 2: Cross-section of tank through the middle. Figs. 3 and 4: Wedge shaped tank within dewatering tank, converting it into classifier. Fig. 5: Dredge set-up for dewatering conglomeration of sand and gravel. Fig. 6: Sand and gravel washing process in which only a small amount of water is required

shows such an arrangement of the conveyor. The scows can be loaded on either side of the dredge simply by reversing the direction of the belt, or the conveyor can be used for loading on one side only to scows or directly to trucks or cars on a bank.

The machine also makes possible a new sand and gravel washing process which is shown diagrammatically by Fig. 6. The novel feature is not in the screen arrangement, but the possibility of adding clean wash water at each screen and getting rid of it after each screening. No water is required for fluming from screen to screen. Since the sand has been rinsed several times it is more apt to be clean. In this process only a relatively small amount of clean water needs to be dealt with at the sand separator, which simplifies a very troublesome problem found in most washing plants. Because of the great quantity of water used in most plants for fluming from screen to screen, large sand separators and classifiers are necessary.

The bin arrangement is very simple. Since the material does not have to be lifted very high, the bins may all be of the same height.

PEERLESS INCREASES THEIR DUST FILTER CAPACITY 59%

Through Modernization . . . using their old case

The outstanding results being achieved in more efficient production and better dust control through modernization, are well illustrated by what the Peerless Cement Corp. of Detroit, accomplished.

They had an 18-foot dust arrestor purchased some years ago. By installing new Sly dust filter parts in only 12 feet of their old case they increased the net cloth filtering area by 59%. The balance of the case they converted into a classifier or settling chamber, resulting in the precipitation of a large percentage of the dust without actually entering the cloth filter section—thereby increasing efficiency of filter, prolonging life of bags, and reducing static resistance to flow of air, saving substantially on power for fan.

Sly filter parts are suitable for other filters as well as Sly, so if you have an old filter of any type, let's see what you can save by modernization.

THE W. W. SLY MFG. CO.

Branch Offices in Principal Cities

4746 TRAIN AVENUE CLEVELAND, OHIO

Making White Cement

(Continued from page 55)

factor metal and the ball mills are stone-lined with flint pebbles for grinding.

The Carrara marble (limestone) deposit, which is well known and appears on maps of the U. S. Geological Survey, is located on 600 acres of patented mineral land, and is almost pure calcium carbonate. The outcrop has a length of more than two miles with a thickness estimated at 2500 ft., and a great depth as indicated by core drilling and shown in the illustration. Plant is located near the California state line, and a good paved road extends 330 miles into Los Angeles, perhaps the greatest white cement market in the world. There are only three other white cement plants in the United States, one in Northern California and two in Eastern Pennsylvania.

Uses for white cement are steadily increasing. It is used for stucco, terrazzo floors, white cement paint, white posts, curbs, center parkways, bridge heads, and in more recent highway construction where white lines are inlaid instead of painted.

Development of the project is under the direction of Harry E. Mick, president and general manager. Mr. Mick received his technical training at the University of Michigan and since 1906 has been identified with the cement industry. His start was in the chemical department, advancing through the positions of chief chemist, superintendent, and chief engineer to the directorship of a new company. Albert A. Hall is secretary-treasurer of the company, O. L. McCain is in charge of all chemical work, and Walter Pierce is plant superintendent.

Carneva Portland Cement Co. is establishing the trade name "Carneva" for their product. The company is a division of and wholly owned by the American Electro-Thermo Corp., incorporated in Nevada for $100,000 with approximately $60,000 in stock and obligations outstanding. In addition to President Mick, who is well known throughout the cement industry, the officers include: Edward L. McInally, New York, N. Y., vice-president, a merchandising sales expert, former secretary of the Chamber of Commerce of the United States, and now secretary of the British Empire Chamber of Commerce in the United States and editor of the magazine, "British World"; and George C. Seward, New York, N. Y., a director and general counsel of the company.

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of January 13:

Central

60659. Establish on **fluorspar** C. L., min. wt. 40,000 lb., to Sheffield, Penn., from Brookport, Golconda, Homberg, Metropolis, Ill., Evanston, Ind., 545c; from Cochrans Spur Eichorn, Rosiclare and Stewart, Ill., 578c net ton.

60693. Establish on **limestone** ground or pulverized, unburnt, straight or mixed C .L., min. wt. 60,000 lb., Bloomington, Ind., to St. Mary's, Ohio, 193c per net ton., via C. I. & L. Ry., LaFayette, Ind., N. Y. C. & St. L. R. R.

60694. Establish on **stone** crushed, in box car equipment, C. L., Kewaunee, Manitowoc and Milwaukee, Wis., to Buffalo, Echota, N. Y., and Pittsburgh, Penn., 330c per net ton.

Note—Proportional rates, applicable on shipments originating west of Kewaunee, Manitowoc or Milwaukee, Wis.

60818. Establish on **limestone**, rough quarried, not suitable for building purposes, in open top cars only, C. L., Wabash, Ind., to Dubuque, Ia., 182c per net ton.

60843. Establish on **quarry refuse**, consisting of crushed or broken silica rock (not ground or pulverized), C. L., New Castle, Penn., to Youngstown, O., 55c net ton.

60845. Establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., Piqua, O., to Metamora, O., 165c per net ton.

60870. Establish on **waste stone**, viz.: **Breakwater, chips, grout, riprap and spauls**, C. L., Orleans, Ind., to Greencastle, Ind., 77c per net ton, via C. I. & L. Ry.

60885. Cancel present rates on **sand** as described in Item 200 of C. F. A. L. Tariff 575 (Descriptions (a) 539c (b) 585c and (c) 539c per net ton), Millington, Oregon, Ottawa, Sheridan, Utica and Wedron, Ill., to Atkins, N. Y. Classn. basis to apply.

60895. Establish on **slag**, granulated (light concrete aggregate), C. L., except when car is loaded to full cubical or visible capacity actual weight will apply, Gary, Ind., to Lexington, Ky., 263c net ton.

60924. Cancel present rate of 99c per net ton on **crushed stone**, C. L., Marble Cliff and West Columbus, O., to Cincinnati, O., rate of 127c per net ton to remain in effect.

60926. Establish on (a) **sand**, naturally bonded moulding, in all kinds of equipment, C. L.; sand (except industrial), in closed equipment, C. L.; (b) sand, ground or pulverized, in all kinds of equipment, C. L.; (c) sand (except industrial) in open top equipment, C. L. (See Note 6), Copley, O., to Thorold, Ont., (a) 341c; (b) 363c and (c) 325c per net ton.

60946. **Limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb. Establish on, from Hannibal, White Bear, Mo., Marblehead and Quincy, Ill., to Anderson, Ind., 259c per net ton.

60947. **Sand, all kinds, or gravel**, in open top equipment, C. L. Establish on, from Mantua, O., to Newton Falls, O., 77c per net ton.

60934. Establish on **crude slag**, not crushed, ground or pulverized, C. L. (See Note 1), Youngstown, O., to Akron and Krumroy, O., 60c net ton, and to expire with June 20, 1940. (Rate will apply only from B. & O. R. R. tracks at Youngstown, O., to B. & O. R. R. tracks at Akron and Krumroy, O., and will not include absorption of connection line switching charge.) Route: Via B. & O. R. R. direct.

61087. **Sand** (except industrial) in open top equipment, C. L. (See Note 6). To establish on, from Essex, Ill., to Muncie, Ind., 160c per net ton.

61103 (1). (a) **Sand**, industrial, C. L.; **sand** (except industrial) in closed equipment, C. L.; (b) **sand**, ground or pulverized, in all kinds of equipment, C. L.; (c) **sand** (except industrial), in open top equipment, C. L.; from Evansville, Ind., Group as defined in Items 6155 to 6700, inclusive, of C. F. A. L. Trf. No. 237-N, to Youngstown, O. (a) 341c; (b) 375c; (c) 341c per net ton.

Trunk

38361. **Broken stone**, C. L. (See Note 3), from Port Deposit, Md., to Baltimore, Md., 121c per net ton in lieu of current sixth class rate of 13c per 100 lb. (See Note 5).

38367. **Mica**, crude, scrap or waste, suitable for grinding purposes only, C. L., min. wt. 90,000 lb., from Custer and Keystone, S. D., to Spruce Pine, N. C., 990c per net ton (See Note 5).

38372. Establish rules governing storage and reconsignment in transit of **mineral wool** (rock or slag wool), C. L., at Dover, N. J., originating at Black Rock, Buffalo, Buffalo Junction, East Buffalo, N. Y., or points west thereof, and destined to eastern points. Transit privilege will only apply when the tariff governing the through rate does not prohibit such transit privilege. Period of time allowed for transit will be 12 months from date of delivery to the transit point, as shown on the inbound freight bill. Transit charge shall be 693c per car, charged on the outbound car

---

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

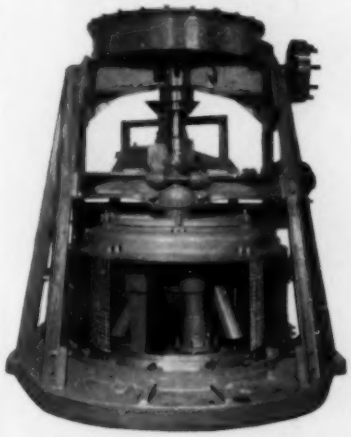
Note 4—Reason: No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

AGRICULTURAL LIMESTONE
PULVERIZERS



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Sturdy and efficient — designed expressly for the manufacture of Agricultural Limestone.

Low initial cost—Low power consumption and operating costs.

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BRADLEY PULVERIZER CO.
Allentown, Pa.

Perforated
METAL SCREENS
ANY SIZE - ANY SHAPE
ANY METAL - ANY PERFORATION
H & K screens are produced to meet the most exacting specification and to serve well and long. Quality and workmanship are given first consideration.
Write for catalog
The Harrington & King PERFORATING Co.

5650 Fillmore St., Chicago—114 Liberty St., N. Y.

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EXCAVATORS
SHOVELS, DRAGLINES,
CRANES, CLAMSHELLS,
PULLSHOVELS
TRUCK SHOVELS, ETC.
½-⅝-¾ Cu. Yds.
and the
GENERAL
SUPERCRANE

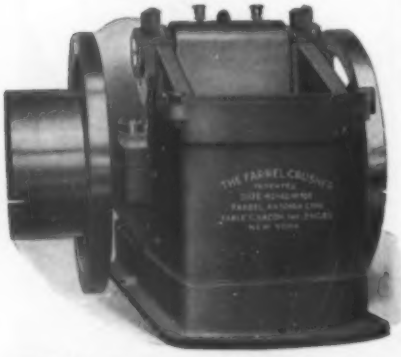
Write for New Catalogs

THE GENERAL EXCAVATOR COMPANY
Marion, Ohio

FARREL BACON
CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants.

Engineering Service



EARLE C. BACON, Inc.
17 John St., New York, N. Y.

which shall be in addition to the through rate. Reason—Comparable with arrangements applying on similar commodities.

38397. **Dolomite,** roasted (refractory dolomite in granular form, treated or untreated, clinkered, or burned to a dead state), C. L., min. wt. 80,000 lb., from Marelan, Que., to New York, N. Y., for export, 25c per 100 lb., in lieu of current rate of 42c per 100 lb., min. wt. 60,000 lb. (See Note 5).

38398. **Limestone,** crude, fluxing, foundry and furnace, in bulk, in open top cars, C. L. (See Note 3), but not less than 80,000 lb., from Chazy, N. Y., to Worcester, Mass., 264c per net ton, in lieu of current sixth class rate of 28c per 100 lbs. (See Note 5).

38399. **Rip rap** or **rubble stone,** C. L., min. wt. (See Note 3), to Wildwood, N. J., from Kingston, N. J., 154c and from Lambertville, N. J., 143c per net ton, in lieu of current sixth class rates (See Note 5).

38404. **Natural stone** other than bituminous asphalt rock), crushed, C. L. (See Note 3), from Coldwater, N. Y., to Cortland, N. Y., 165c per net ton, in lieu of current sixth class rate (See Note 5).

38429. **Roofing granules** (consisting of crushed slate or crushed stone or made from clay or from silica sand or from crushed slag or iron ore tailings), C. L., min. wt. 60,000 lb., from Bound Brook, N. J., to Downieville, Penn., 374c per net ton, in lieu of current sixth class rate of 30c per 100 lb. (See Note 5).

M-3995 (increase). Cancel commodity rate of $2.86 per net ton on **ganister rock,** not ground, C. L., from Hancock, W. Va., to Alloy, W. Va., as published in Item 3080 of Agent Curlett's Tariff I. C. C. A-621. (See Note 4.)

M-3998 (increase). Cancel commodity rate of 34c per 100 lb. on **whiting,** C. L., min. wt. 40,000 lb., from points taking Scranton, Williamsport and Baltimore bases to Toronto, Ont., as provided for in Item 3955 of Agent Curlett's Tariff I. C. C. A-621. (See Note 4.)

M-4004. Cancel commodity rate of 20c per 100 lb. on **ganister rock,** not ground, C. L., from Hancock, W. Va., to Welland, Ont., as published in Item 3080 of Agent Curlett's Tariff I. C. C. A-621. (See Note 4.)

M-4007 (increase). Cancel Item 3530 of Agent Curlett's Tariff I. C. C. A-621 covering rate of 26c per 100 lb. on **slate,** crushed, dust or ground, from Bangor, Belfast, Pen Argyl, Portland, Penn., etc. to Bowmanville and Toronto Ont. Reason: To conform to 4th Section of the act.

M-4040. **Talc tailings,** C. L., min. wt. 70,000 lb., from Easton (13th St.), Penn., and Easton (Bushkill Station), Penn., to Keyport, N. J., 10c per 100 lb. (See Note 5).

Southern

2506. **Lime,** common, hydrated, quick or slaked, in bags or barrels, min. wt. 50,000 lb., from Mosher, Mo., to Gulf Ports named in item No. 1 to SPFFC Export Freight Tariff No. 1016-H. Present basis—Domestic rates apply. For examples, to New Orleans, La., $4.20 per ton per Item No. 33788, SFTB Tariff No. 131-J. Proposed rate—Establish export shipside rate of $3.60 per ton of 2000 lb.

21042. **Stone, crushed,** C. L. Cancel, as obsolete, rate of 396c net ton, Knoxville, Mascot and Strawberry Plains, Tenn., to E. St. Louis, Ill., and St. Louis, Mo.

21048. **Stone,** crushed, or **rubble,** C. L., cancel rate of 127c net ton from Boxley, Va., to Platform 9, Platform 10, Churchland, Centenary, Platform 13 and Pig Point, Va., published in A. C. L. I. C. C. B-2940. Rate of 115c net ton (S. F. T. B. Tariff 388-C) to apply after cancellation.

21117. **Slag,** C. L. Establish to Atlanta, Ga., from Alabama City, Ala., 105c, and Birmingham, Ala., and group 123c net ton.

21167. **Limestone,** ground or pulverized, C. L., min. 60,000 lb. Establish from Dugan, Ky., to Ashland and Van Lear, Ky., 270; Huntington W. Va., 237; Milton, W. Va., 248; Charleston, W. Va., 259; Bluefield, W. Va., 314c net ton.

21194. **Chert,** C. L. Establish 125c net ton—Cumnock, N. C., to Norfolk and Newport News, Va.

21235. **Crushed stone,** C. L. Reduce present rates 20c net ton from Connell, Haile, Hodgson, Kendrick, McAllister, Reddick and York, Fla., to Yukon, Fla. Water competitive. Expires 12/31/40.

21298. **Stone, limestone, granite** or **marble, broken, crushed, granulated** and **rubble stone,** C. L. Establish 110c net ton, Anderson, Tenn., to Nashville, Tenn.

21299. **Gravel,** C. L. Establish 95c net ton, Augusta, Ga., to Savannah, Ga. Water competitive. Expires Dec. 31, 1940.

21301. **Water granulated slag,** C. L. Establish intrastate 55c net ton, Thomas, Ala., to Greystone, Ala.

21330. **Stone, crushed,** C. L. Establish 110c net ton, Brooksville, Fla., to Yukon, Fla. Water competitive. Expires December 31, 1940.

New England

49144. Cancel rate of $1.38 net ton on **stone,** viz., bridge stone, curbing, rip rap and rubble from Millstone to New Hartford, Conn., as named in N. H. R. R. Connecticut Tariff F-817, and apply in lieu thereof class rates as published in N. H. R. R. I. C. C. F-3200. Reason—Obsolete.

49181 (2-R). **Whiting** min. wt. 50,000 lb., Boston, Mass., to Montreal, Que.

THE ROSS FEEDER

Completely controls the flow of any size material from Storage Bins, Hoppers or Open-Dump Chutes to Crushers, Conveyors, Screens, etc.

High in efficiency. Low in maintenance and power consumption.

Furnished in sizes to suit your operation. Send full particulars for recommendation.

ROSS SCREEN & FEEDER CO.

19 Rector Street
NEW YORK, U. S. A.

2 Victoria Street
LONDON, S. W. 1., ENGLAND

Present—33. Proposed—25. Reason: To establish a rate comparable with other rates now published on this material.

49256 (1-R). **Crushed stone**, min. wt. 50 net tons, except when cars of lower capacity are furnished for carriers' convenience (See Note 1), Lynn, Mass., to Merrimack, N. H. Present—99 (B. & M. I. C. C. A-3000). Proposed—70 net ton. Reason: To enable B. & M. R. R. to receive a haul on this traffic.

Southwestern

18975. **Sand and gravel.** Establish rate of $1.50 per ton of 2000 lb. as described in SWL Tariff 162-N, C. L., from Ady, Tex., to Supply, Okla.

19147. **Sand and gravel**, Ady, Magenta and Murdo, Tex., to Supply, Alston, Fargo, Gage and Woodward, Okla. Establish the following rates in cents per ton of 2,000 lb., as described in Item 40, S. W. L. Tariff 162-N, I. C. C. 3157, C. L., from and to points shown below:

	From—		
To	Ady	Magentaa	Murdo
Gage, Okla.	132	137	141
Fargo, Okla.	137	141	150
Woodward, Okla.	141	150	150
Supply, Okla.	150	150	158
Alston, Okla.	150	150	150

Illinois

I. R. C. 7496-5. **Sand, gravel, crushed stone**, C. L., to Chatsworth, Ill., and intermediate points:

	From (Rep.)					
	Lehigh		Thornton		Peoria	
To (Rep.)	*	†	*	†	*	†
Kankakee, Ill.	42	NC	84	NC	125	NC
Dickeys, Ill.	83	71	97	85	135	123
Cabery, Ill.	84	71	98	85	135	122
Stoddards, Ill.	97	84	111	98	124	111
Elders, Ill.	97	NC	111	NC	124	111
Barnes, Ill.	97	NC	111	NC	103	NC

	From (Rep.)			
	Lincoln		Forreston	
To (Rep.)	*	†	*	†
Kankakee, Ill.	111	NC	...	...
Dickeys, Ill.	121	109	135	123
Cabery, Ill.	121	108	135	122
Stoddards, Ill.	110	97	124	111
Elders, Ill.	110	97	124	NC
Barnes, Ill.	89	NC	124	NC

NC—No change. * Present. † Proposed.

I. R. C. 7560-B. **Agricultural limestone**, crushed or ground, min. wt. 10 per cent less than marked capacity of car, but not less than 40,000 lb., from Mosher and Ste. Genevieve, Mo., to the following Illinois points. ("A" refers to present rate; "B" to proposed rate): To Holland (A) 149c, (B) 122c; Altamont (A) 139c, (B) 116c; Kinmundy (A) 123c, (B) 116c; Benton (A) 123c, (B) 123c; Marion (A) 123c, (B) 123c.

OBITUARIES

MEADE FRIERSON, formerly president of the Estill Springs Sand & Gravel Co., Nashville, Tenn., died December 25 at the age of 78.

•

FRED H. BULLEN, president of the Fountain Sand & Gravel Co., Pueblo, Colo., passed away January 6. He was 72 years of age and had been in the sand and gravel business since 1913.

•

DEWITT CLINTON MCKEE, vice-president in charge of operations of the Bessemer Limestone and Cement Co., Youngstown, Ohio, died January 8 at the age of 51. He had started working for the Bessemer company in 1919 as quarry workman and advanced from position to position until he was elected vice-president in charge of operations in 1936.

•

MICHAEL LUERY, president of the American Rock Wool Corp., Wabash, Ind., died recently at the age of 62.

•

HOWARD PLATT TREADWAY, president and director of the Kansas City Crushed Stone Co., Kansas City, Mo., died December 26 at the age of 65. He also was president and treasurer of the Kansas City Bridge Co., and a director of the Shenandoah-Dives Mining Co.

•

CHARLES J. LARKIN, president of the Rock Island Sand & Gravel Co., Rock Island, Ill., since it was organized in 1902, died January 1. He was 81 years of age and began work as an independent building contractor when he was 25.

•

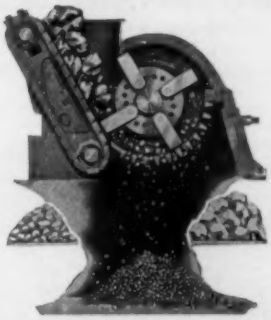
CLYDE V. IRELAND, a partner of the Ireland & Lester sand and gravel business, Benton Harbor, Mich., passed away December 26 at the age of 62.

LOAD the CHEAPEST WAY—

The cheapest loading method is the one that holds the trucks for the shortest time. Truck time is the important factor in loading costs. Since 1919 Barber-Greene Loaders have continuously earned this reputation. Write for complete information, there is no obligation.

Standardized Material Handling Machines
BARBER GREENE
Aurora, Illinois
39-13

A New High Degree of Crushing Efficiency



More production — more profit —lower operating and maintenance costs. All these are features of DIXIE performance.

Simple in design, yet sturdy in construction. DIXIE NON-CLOG and Regular Stationary Breakers are unexcelled for primary, secondary or fine reduction. Note particularly the continually moving breaker plate which means that DIXIE Hammermills will outlast and out-perform any other type.

Write for complete details on DIXIE'S 40 sizes.

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★ MANGANESE STEEL CASTINGS ★

for CRUSHERS PULVERIZERS ROLLS SCREENS

INDIAN BRAND

for SHOVELS DREDGES CRANES CONVEYORS

The Frog, Switch & Mfg. Co.
Established 1881 CARLISLE, PA.

New Incorporations

Sun Stone Co., Hartford Ky., has been incorporated for $12,000 by Ira Daugherty, W. H. Dunn and R. T. Collins.

Conklin & Sons Co., Madison, Wis., has been incorporated with a capital of 1000 shares at $100 per share. Incorporators are J. B. Conklin, Grave McManamy Conklin and Goodwin R. Lyons.

Trinity River Sand and Gravel Co., Houston, Tex., has been incorporated by Louis Richker and Joe Richker.

PYRASTEEL
for high temperatures
SEGMENTAL
KILN ENDS

FOR any diameter of cement kiln . . . . . insures tight sealing, saves fuel, improves burning, reduces production costs. Standard units are easy to handle and simple to install. Segment can be replaced without tearing down ring. *Write for Bulletin.*

Chicago Steel Foundry Company
37th Street at Kedzie Avenue
Chicago, Illinois
Makers of Alloy Steel for 30 Years

Sunset Rock & Sand Co., Miami, Fla., has been incorporated. Capital is 50 shares no par value and directors are W. M. O'Bryan, H. Goldberg, and B. Lanier.

Inter-state Construction Co., Lowellville, Ohio, has been incorporated with 250 shares of stock to operate the old Erskine limestone quarry northeast of Lowellville. Incorporators are Steve Quinn, Gallitzen Reilly and A. McCullough.

Elam Brothers Corp., Rochester, N. Y., has been granted a charter with a capital of 200 shares no par value. Agent is Alfred Newnam, 401 Broadway, New York, N. Y.

Sulphur Sand Co., Oklahoma City, Okla., has been incorporated by E. P. Allen, Murtle B. Allen and Alvis F. Allen. Capital stock is $20,000.

Hancock Gravel Co., Tallahassee, Fla., has been incorporated with a capital of 100 shares, no par value, by C. L. Waller, B. A. Meginnis and B. C. Willis.

American Slate Co., Arvonia, Va., has been granted a charter. Incorporators are Charles M. Trammell and John O. Dahlgren and capital is $50,000.

Russell W. Ward, Inc., Camden, N. J., has been granted a charter to produce gravel with a capital of 300 shares. Agent is Russell M. Ward.

Hempstead Gravel Co., Inc., Houston, Tex., has been granted a charter. Capital stock is $1000 and incorporators are Russell A. Bonham, Mary Nan Bonham and Frank Berry.

Fort Smith Sand and Gravel Co., Fort Smith, Ark., has been incorporated with an authorized capital stock of 200 shares valued at $100 each and $10,000 paid in capital. Incorporators are C. H. Baker, H. L. Denton and C. J. Denton.

Criss Concrete Co., Parkersburg, W. Va., has received a state charter with an authorized capital of $25,000. Incorporators are A. V. Criss, E. J. Criss and J. F. Hill.

Quaristone, Inc., Manhattan, N. Y., has been granted a charter. Capital is 200 shares no par value and Paul T. Davis, 15 E. 40th St., New York, N. Y., is incorporator.

Rockwall Corp., Buffalo, N. Y., has been incorporated by Elmer Finck with a capital of $10,000.

Venango Coal and Limestone Co., Franklin, Penn., has filed articles of incorporation with a capital of $50,000. The company will take over the plant formerly operated as the Richland Coal and Limestone Co. Frank Hewitt will be manager.

Concho Sand & Gravel Co., Oklahoma City, Oklahoma., has been granted a charter with a capital of $50,000 held by Moore C. Hess, Rae M. Hess and Harvey P. Everest. It was formerly known as the Concho Washed Sand Co.

Samson Plaster Board Co., Chicago, Ill., has been incorporated to deal in gypsum and gypsum rock with a capital of $10,000, par $100. Incorporators are Charles M. Price, Clifford C. Pratt,and Robert C. Kelk. Corporation Trust Co., 208 S. LaSalle St., Chicago, is the agent.

Desert Talc & Clay Co., Los Angeles, Calif., has filed articles of incorporation. It is authorized to issue $100,000 in shares of stock and its directors are K. C. Stopp, L. J. Elliott, A. P. LaChance, R. J. Schrader and W. J. Johnson.

Franklin Phosphate Corp., Nashville, Tenn., has been incorporated by John H. Kresge, Daniel A. Lindsay and Sherman Napier, with a capital of 25,000 shares no par value.

Tilecrete Corp., Arlington, Va., has been granted a charter with a capital of $25,000.

Manufacturers' News Notes

Blaw-Knox Co., Pittsburgh, Penn., announces the appointment of Lawrence E. Joseph as executive officer in charge of its Blaw-Knox Division to succeed R. F. McCloskey, Sr., a company vice-president, who was placed in charge of the development of new products for the entire corporation.

Roads Construction Co., Ltd., Oakland, Calif., manufacturers of Noble batchers, are moving to a new and larger plant at 1860 Seventh St., Oakland.

Joseph T. Ryerson & Son, Inc., Chicago, Ill., is adding a new all-steel 75- x 555-ft. building to its Chicago plant.

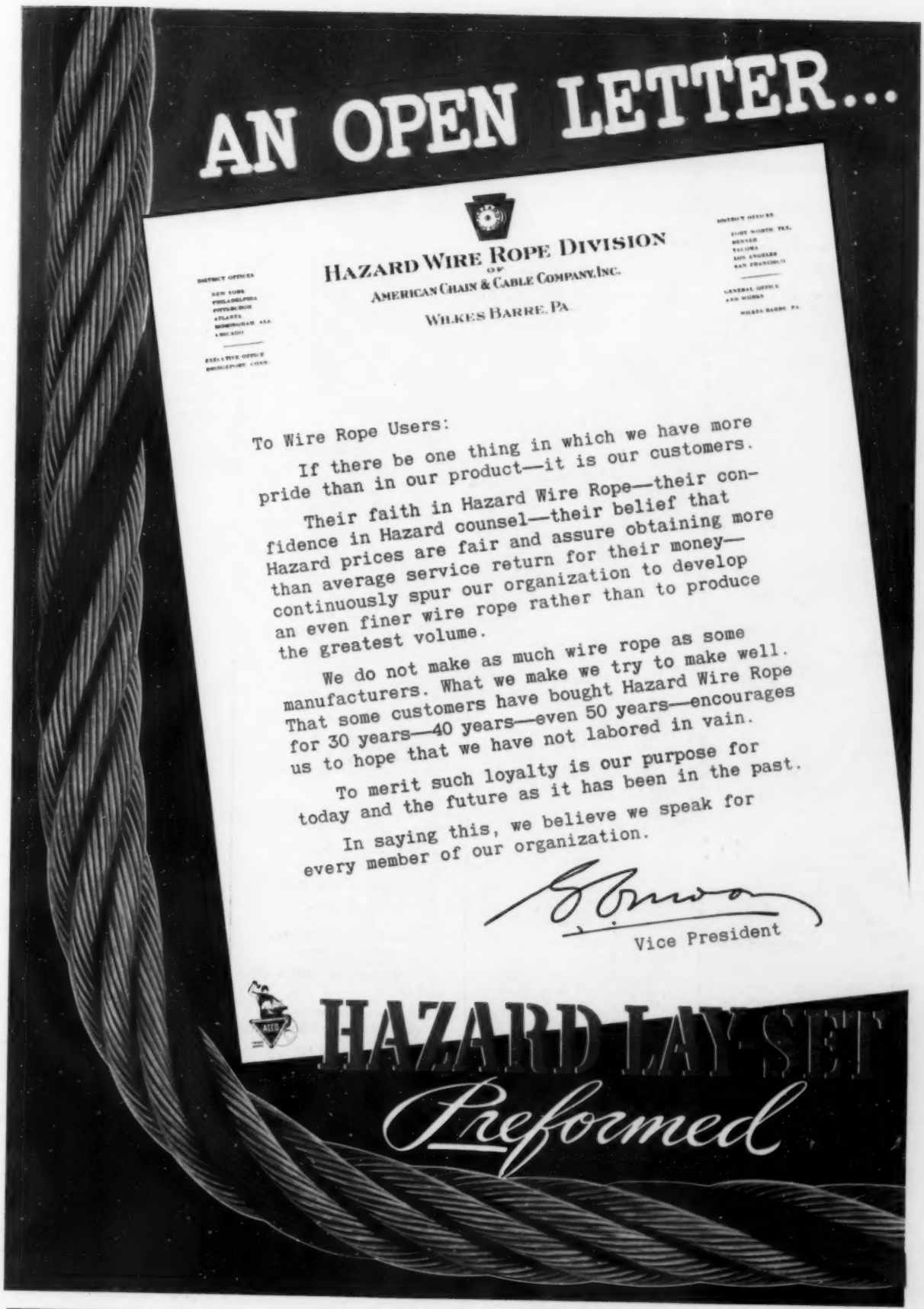
John A. Roebling's Sons Co., Trenton, N. J., announces that Charles G. Williams has been appointed general manager. He was formerly vice-president in charge of purchasing and manufacturing operations for the fifteen plants of American Chain and Cable Co., Inc.

Davenport-Besler Corp., Davenport, Iowa, announces the passing of their president, Charles Pasche, on November 15.

ANOTHER KERN RADIAL STORAGE SYSTEM INSTALLED BY T.V.A. FOR THE WATTS BAR DAM PROJECT – NEAR SPRING CITY, TENN.

LIKE ALL KERN SYSTEMS IT PERMITS STORAGE OF LARGE QUANTITIES OF AGGREGATE FORESTALLING DELAYS IN SHIPMENTS AND OPERATIONS — ASSURES EFFICIENCY AND ECONOMY

P. O. BOX 2057 **FRED T. KERN CO.** Milwaukee, Wis.


AN OPEN LETTER...
HAZARD WIRE ROPE DIVISION
OF
AMERICAN CHAIN & CABLE COMPANY, INC.
WILKES BARRE, PA.
To Wire Rope Users:
If there be one thing in which we have more pride than in our product—it is our customers.
Their faith in Hazard Wire Rope—their confidence in Hazard counsel—their belief that Hazard prices are fair and assure obtaining more than average service return for their money—continuously spur our organization to develop an even finer wire rope rather than to produce the greatest volume.
We do not make as much wire rope as some manufacturers. What we make we try to make well. That some customers have bought Hazard Wire Rope for 30 years—40 years—even 50 years—encourages us to hope that we have not labored in vain.
To merit such loyalty is our purpose for today and the future as it has been in the past.
In saying this, we believe we speak for every member of our organization.
Vice President
HAZARD LAY SET
Preformed

Classified Directory of Advertisers

For alphabetical index see page 112

Abrasion Resisting Plates
Frog, Switch & Mfg. Co.

Abrasives
Wall-Colmonoy Corp.

Aerial Tramways
American Cable Co.
Hazard Wire Rope Co.
Jeffrey Mfg. Co.
Leschen, A. & Sons Rope Co.
Link Belt Co.

Agitators
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Dorr Co., Inc.
Smidth, F. L. & Co.
Traylor Engineering & Mfg. Co.

Air Compressors
Allis-Chalmers Mfg. Co.
Fuller Company
Nordberg Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Air Filters
Blaw-Knox Co.
Fuller Company
Northern Blower Co.
Sly, W. W., Mfg. Co.
Western Precipitation Co.

Air Heaters
Babcock & Wilcox Co.

Air Separators
Babcock & Wilcox Co.
Blaw-Knox Co.
Bradley Pulverizer Co.
Combustion Engr. Corp.
Gruendler Crusher & Pulverizer Co.
Link-Belt Co.
Northern Blower Co.
Raymond Pulv. Div.
Smidth, F. L., & Co.
Sly, W. W., Mfg. Co.
Sturtevant Mill Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Airveyors
Fuller Company

Alloys (Metal)
Chicago Steel Foundry Co.
Frog, Switch & Mfg. Co.
Wall-Colmonoy Corp.

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Barber-Greene Co.
Easton Car & Construction Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Robins Conveying Belt Co.

Asphalt Mixing Plants
Easton Car & Construction Co.
Iowa Mfg. Co.
Traylor Engr. & Mfg. Co.

Axles
Eagle Iron Works
Easton Car & Construction Co.

Babbit Metal
Allis-Chalmers Mfg. Co.
Dixie Machy. Mfg. Co.
Ryerson, Jos. T. & Sons, Inc.

Backdiggers
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
General Excavator Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Marion Steam Shovel Co.

Bag Cleaning Machines
Link-Belt Co.
Northern Blower Co.
Stearns Mfg. Co.

Bagging Machines
Smidth, F. L., & Co.

Baiers or Bundling Machines (Sack)
Besser Mfg. Co.
Stearns Mfg. Co.

Balls (Grinding)
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Barges
Chicago Bridge & Iron Co.
Eagle Iron Works

Batchers (Weighing and Measuring Volume)
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Fuller Company
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Smith, T. L., Co.
Stearns Mfg. Co.

Batteries
Goodyear Tire & Rubber Co.

Bearing Metals
Allis-Chalmers Mfg. Co.
Robins Conveying Belt Co.

Bearings (Anti-Friction)
Chain Belt Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.

Bearings (Roller)
Easton Car & Construction Co.
Link-Belt Co.
Robins Conveying Belt Co.

Bearings (Tapered Roller)
Link-Belt Co.

Belt Fasteners or Hooks
Robins Conveying Belt Co.

Belt Idlers
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Smith Engr. Works

Belting (Chain)
Chain Belt Co.

Belting (Conveyor & Elevator)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Chain Belt Co.
Goodyear Tire & Rubber Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Belting (Transmission)
Bacon, Earle C., Inc.
Chain Belt Co.
Goodyear Tire & Rubber Co.
Link-Belt Co.
Smidth, F. L., & Co.

Belting (V-Type)
Allis-Chalmers Mfg. Co.
Goodyear Tire & Rubber Co.

Belt Tighteners
Link-Belt Co.
Robins Conveying Belt Co.

Belt Trippers
Bacon, Earle C., Inc.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Bin Gates
Allis-Chalmers Mfg. Co.
Austin-Western Road Machinery Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Fuller Company
Gruendler Crusher & Pulverizer Co.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Iowa Mfg. Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Northern Blower Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engr. Works
Traylor Engr. & Mfg. Co.

Bins (Storage)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
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McLanahan & Stone Corp.
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Bin Indicators
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Blasting Cap Crimpers
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Blasting Supplies
Ensign-Bickford Co.

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Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

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Chain Belt Co.
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Link-Belt Co.
Robins Conveying Belt Co.

Blocks (Sheave)
Link-Belt Co.
Pioneer Engineering Works
Sauerman Bros., Inc.

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Allis-Chalmers Mfg. Co.
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Sly, W. W., Mfg. Co.

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Chicago Bridge & Iron Co.

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Link-Belt Co.
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Boilers
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Combustion Engineering Co.

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Jackson & Church Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

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Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Link-Belt Co.
Robins Conveying Belt Co.

Buckets (Conveyor & Elevator)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Chicago Steel Foundry Co.
Eagle Iron Works
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Iowa Mfg. Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Works
Robins Conveyng Belt Co.
Smidth, F. L., & Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Buckets (Dragline & Slackline)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Gruendler Crusher & Pulverizer Co.
Hayward Co.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Link-Belt Co.
Pioneer Engineering Works
Sauerman Bros., Inc.

Buckets (Dredge & Excavator)
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.
Hendrick Mfg. Co.

Buckets (Dump)
Dempster Bros., Inc.
Jaeger Machine Co.

Building Tile Machines
Besser Mfg. Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Bulk Cement Batching Plants
Heltzel Steel Form & Iron Co.

Bulk Cement Storage Plants
Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Bulldozers
Blaw-Knox Co.
Bucyrus-Erie Co.

Bullscrapers
Bucyrus-Erie Co.

Bushings
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.

Cableways
American Cable Co.
Bucyrus-Erie Co.
Hazard Wire Rope Co.
Leschen, A., & Sons, Rope Co.
Link-Belt Co.
Sauerman Bros., Inc.

Calcining Equipment
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Bradley Pulverizer Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Capstans
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Car Couplings & Hitches
Easton Car & Construction Co.

Car Dumpers
Eagle Iron Works
Easton Car & Construction Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

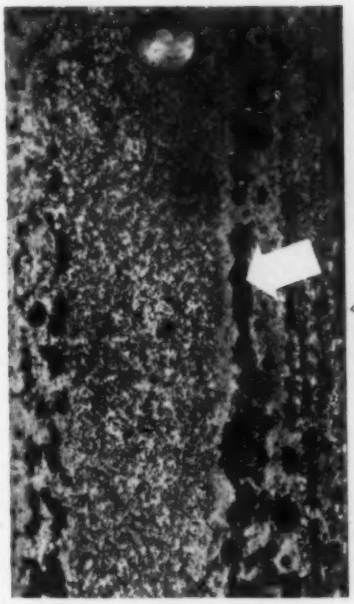
Car Pullers & Movers
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cars (Industrial, Quarry, Dump, Concrete, Block, etc.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Eagle Iron Works
Easton Car & Construction Co.
Link-Belt Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.
Traylor Engr. & Mfg. Co.

Car Wheels
Chase Foundry & Mfg. Co.
Eagle Iron Works
Easton Car & Construction Co.
Iowa Mfg. Co.
Link-Belt Co.

Carts
Blaw-Knox Co.
Jaeger Machine Co.

Use this
IMPROVED SLUSHING COMPOUND
to protect highly finished metal surfaces



Look at the Difference!

These two similar pieces of metal, one slushed with GULF OILCOAT NO. 1 and the other with a conventional slushing compound, were exposed to highly corrosive influences for the same length of time. The superior value of GULF OILCOAT NO. 1 is clearly demonstrated by the perfect condition of the metal plate on the left.

GULF OILCOAT NO. 1 is easily applied, long lasting and economical to use

YOU can now secure an improved material to protect highly finished surfaces of steel and non-ferrous metal products against corrosion—GULF OILCOAT NO. 1. This product is an entirely new type of slushing compound, developed by Gulf technologists after many years of research and field tests.

While GULF OILCOAT NO. 1 provides a thin film which is not easily rubbed off by handling, it may be readily removed by conventional solvents. Accelerated laboratory corrosion tests, as well as field tests with all types of metals have established the superiority of this new type of slushing material over products formerly used for this purpose.

GULF OILCOAT NO. 1 can be applied by any conventional method and lasts for a long period of time. It is nominally priced and economical to use. Ask the Gulf representative who calls on you to give you further details—or fill in and mail the coupon below for complete information.

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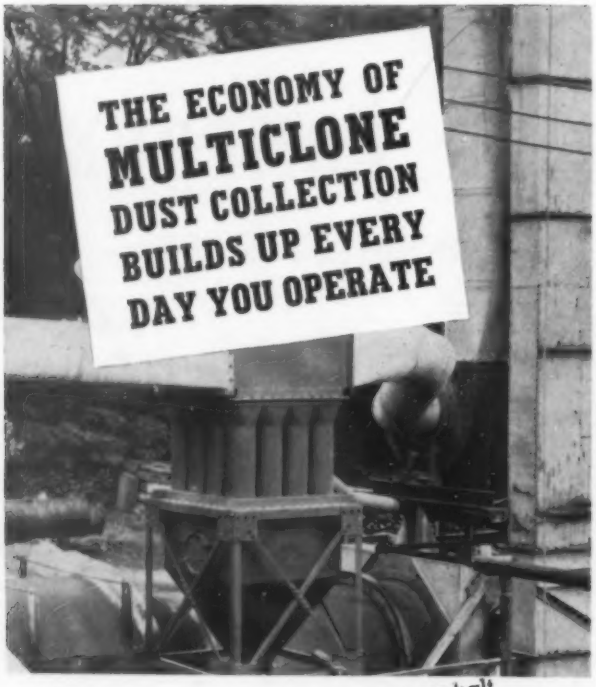
Gulf Oil Corporation—Gulf Refining Company
Room 3813, Gulf Building, Pittsburgh, Pa.

Please send me complete information and price quotations on GULF OILCOAT NO. 1.

Name .....

Company .....

Address .....



Multiclone Dust Collectors at asphalt plants, rock crushing and sand drying plants are operating in capacities varying from 6000 to 50,000 c.f.m. at total efficiencies up to 97% or higher.

With an Impax Separator ahead of the Multiclone, coarse particles are automatically collected in a separate hopper.

Recorded temperatures at hot and cold mix plants range from atmospheric to 500° F.

Cast iron vanes, cones and liners insure long life and economical replacement.

Multiclones are highly efficient in recovering cement dust from kilns, and can be designed to collect a high percentage of particles down to the lower micron brackets.

In a recent 90,000 c.f.m. installation, the over-all efficiency is 95.5% collection of all plus 5 micron sizes, and 99.5% of all particles 10 microns and over.

Typical Multiclone tube unit in section showing cast iron vane and renewable cone. Assemblies are made in parallel for any capacity.

WESTERN PRECIPITATION CORPORATION

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Los Angeles, California
Chrysler Bldg., New York

Write now on your executive letterhead for new Bulletin—free.

MULTICLONE
MECHANICAL DUST COLLECTORS

Classified Directory (Cont.)

Link-Belt Co.
Robins Conveying Belt Co.

Castings
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Chain Belt Co.
Chicago Steel Foundry Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Wall-Colmonoy Corp.

Cement Colors
Mepham, Geo. S., Corp.

Cement Plants
Allis-Chalmers Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Cement Pumps
Fuller Co.
Smidth, F. L., & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.
Chain Belt Co.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.

Chain (Conveyor & Elevator)
Bacon, Earle C., Inc.
Chain Belt Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Chain (Dredge & Shovel)
Bucyrus-Erie Co
Chain Belt Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Chimney Block Machines & Molds
Besser Co.
Multiplex Concrete Machy. Co.

Chutes (Bin, Concrete, etc.)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Chain Belt Co.
Chicago Bridge & Iron Co.
Concrete Transport Mixer Co.
Eagle Iron Works
Fuller Co.
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Northern Blower Co.
Pioneer Engineering Works
Robins Conveying Belt Co
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Chute Liners
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co.
Goodyear Tire & Rubber Co.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Circuit Breakers
Allis-Chalmers Mfg. Co.

Clarifiers
Chain Belt Co.
Dorr Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Classifiers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Bradley Pulverizer Co.
Deister Machine Co.
Dorr Co., Inc.
Eagle Iron Works
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machy. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Northern Blower Co.
Pioneer Engineering Works, Inc.
Raymond Pulverizer Div.
Research Corp.
Simplicity Engineering Co.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Universal Vibrating Screen Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Clutches
Allis-Chalmers Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Coal Pulverizing Equipment
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy Co.
Babcock & Wilcox Co.
Bradley Pulverizer Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div
Smidth, F. L., & Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Concentrators
Deister Machine Co.
Dorr Co., Inc.

Concrete Mixers
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Concrete Transport Mixer Co.
Gruendler Crusher & Pulverizer Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machy. Co.
Smith, T. L., Co.
Stearns Mfg. Co.

Controllers (Electric)
Allis-Chalmers Mfg. Co.

Converters (Electric)
Allis-Chalmers Mfg. Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Chain Belt Co.
Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Conveyors (Apron)
Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Chain Belt Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Conveyors (Belt)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Chicago Steel Foundry Co.
Fuller Co.
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Industrial Brownhoist Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Machy. Co.
Pioneer Engineering Works.
Robins Conveying Belt Co.
Smidth, F. L., Co.

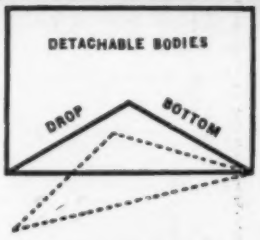
1940 Another LIMA Year

This year as in years past, **LIMA** shovels, draglines and cranes lead in design, economy and performance. They have been proved dependable and economical on many of the biggest jobs in the country. Whatever kind of material you have to move, you can be certain that **LIMA** will do the job in the least possible time with more profit for you.

LIMA LOCOMOTIVE WORKS, INCORPORATED
SHOVEL and CRANE DIVISION - - - LIMA, OHIO

LIMAS ARE BUILT IN ¾ YARD CAPACITY and LARGER

DEMPSTER DUMPSTER



- *No High Pressure Hose*
- *No Counterweight*
- *No Auxiliary Jacks*

LF-2—ONE OF THE NEW MODELS

Model LF-2, carrying either the detachable Drop-Bottom, Tilt-Type or Skip Bucket, has the center of gravity well ahead of the rear axle. Built in sizes for handling the heaviest materials up to and including 4 cubic yards and for lighter materials up to 6 cubic yards. Ask your dealer . . . or write us for facts proving that hand-loading costs can be reduced as much as 60 per cent!

From Maine to California, in Canada, South America . . . DEMPSTER-DUMPSTERS are handling every type of material from rock to sand, from concrete to liquids. Built in a variety of sizes from 2 to 6 cubic yards capacity, one truck with a DUMPSTER and 6 to 10 detachable containers will do the work of several trucks at a saving up to 50 per cent. It's the "Payoff" in hand-loading! Get the Facts NOW!

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DEMPSTER BROTHERS, Inc. KNOXVILLE TENNESSEE

Classified Directory (Cont.)

Smith Engineering Works
Sturtevant Mill Co.
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Drag-Chain)
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Overhead)
Chain Belt Co.

Conveyors (Pan)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Pneumatic)
Fuller Co.
Gruendler Crusher & Pulverizer Co.
Northern Blower Co.
Raymond Pulverizer Div.

Conveyors (Portable)
Austin-Western Road Machy. Co.
Barber-Greene Co.
Fuller Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engineering Works, Inc.
Robins Conveying Belt Co.
Universal Crusher Co.

Conveyors (Screw)
Besser Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.

Conveyors (Trolley)
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.

Conveyors (Vibrating)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Coolers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Correcting Basins
Smidth, F. L., & Co.

Cottrell Precipitators
Research Corp.
Western Precipitation Co.

Couplings (Flexible & Shaft)
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cranes (Diesel, Electric, Gasoline, Steam)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
General Excavator Co.
Industrial Brownhoist Corp.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Marion Steam Shovel Co.
Universal Crusher Co.

Cranes (Overhead Traveling)
Industrial Brownhoist Corp.

Cranes (Tractor)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Cranes (Truck)
Link-Belt Speeder Corp.

Crawler Attachments
Allis-Chalmers Mfg. Co.
Link-Belt Co.

Crawling Tractor Excavators
Austin-Western Road Machy. Co.
General Excavator Co.
Link-Belt Co.

Crusher Parts
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bradley Pulverizer Co.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw & Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Crushers (Laboratory)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
Allis-Chalmers Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers Reduction
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Eagle Iron Works
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushing Rolls
Austin-Western Road Machy. Co.
Eagle Iron Works
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushing & Screening Plants (Portable)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Dixie Machy. Mfg. Co.
Eagle Iron Works
Gruendler Crusher & Pulverizer Co.
Heltzel Steel Form & Iron Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Smith Engr. Works
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Dedusters
Blaw-Knox Co.
Western Precipitation Co.

Dehydrators
Pioneer Engineering Works, Inc.

Derricks
Hayward Co.

Detonators
Ensign-Bickford Co.

Dewatering Equipment
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Dorr Co., Inc.
Eagle Iron Works
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Diaphragms (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel)
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
General Excavator Co.
Link-Belt Co.
Marion Steam Shovel Co.

Disintegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Link-Belt Co.
Marion Steam Shovel Co.

Dragline & Cableway Excavators
American Cable Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
General Excavator Co.
Hazard Wire Rope Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Marion Steam Shovel Co.
Pioneer Engr. Works, Inc.
Sauerman Bros., Inc.

Dredge Cutter Heads & Ladders
Bucyrus-Erie Co.
Eagle Iron Works

Dredge Hulls
Chicago Bridge & Iron Co.
Eagle Iron Works

Dredges
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Link-Belt Co.
Marion Steam Shovel Co.

Drill Bits
Bucyrus-Erie Co.

Drill Sharpening Machines
Bucyrus-Erie Co.

Drilling Accessories
Bucyrus-Erie Co.

Drills (Blast Hole)
Bucyrus-Erie Co.

Drills (Rock)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.

Drills (Well)
Bucyrus-Erie Co.

Drives (Belt, Chain & Rope)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Short-Center)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engr. Co.
Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Dust Arrestors
Blaw-Knox Co.
Research Corp.
Western Precipitation Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Buell Engineering Co., Inc.
Chicago Bridge & Iron Co.
Hendrick Mfg. Co.
Northern Blower Co.
Raymond Pulverizing Div.
Research Corp.
Sly, W. W., Mfg. Co.
Smidth, F. L., & Co.
Sturtevant Mill Co.
Western Precipitation Co.

Dust Collecting Bags
Blaw-Knox Co.
Sly, W. W., Mfg. Co.

Dust Conveying Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Fuller Co.
Raymond Pulverizer Div.
Research Corp.
Sly, W. W., Mfg. Co.
Western Precipitation Co.

Dust Precipitators
Research Corp.
Western Precipitation Co.

Dust Recovery Plants
Research Corp.
Sly, W. W., Mfg. Co.
Western Precipitation Co.

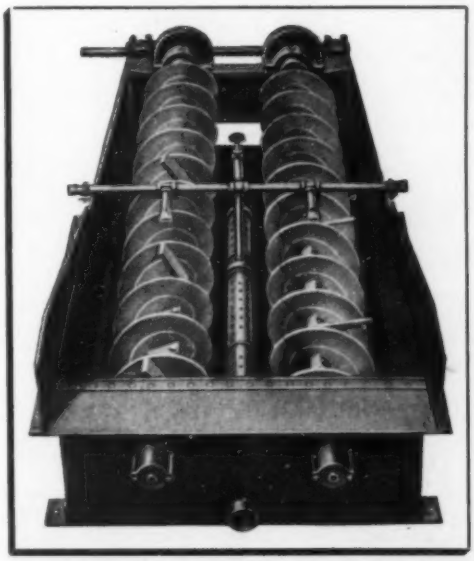
Electric Motors
Allis-Chalmers Mfg. Co.
Hayward Co.

Electric Motor Starters
Allis-Chalmers Mfg. Co.

Elevators
Allis-Chalmers Mfg. Co.

NOW IS THE TIME TO PLAN FOR 1940

Lower costs will mean extra profits



This DOUBLE SPIRAL SCREW WASHER is specifically designed to deliver a finished product of the finest quality at the lowest operating costs.

The sectional spiral screws draw the aggregates to the center of the tub and convey them upward to the discharge end, at the same time thoroughly scrubbing, bent bar agitators assisting the screw action. Wash water inlets arranged along the tub bottom between the two screws, carry foreign material to the surface where it is washed out with overflow water at lower tub end.

Timken roller bearings carry the upper shaft ends, taking downward thrust, and cutless rubber bearings are used at the lower ends of the shafts which are subject to abrading action of the dirty water.

Also available with self-contained diesel or electric power unit, mounted on upper end of washer tub.

Write for catalogs on EAGLE SPIRAL SCREW WASHER, EAGLE LOG WASHER, AND THE "SWINTEK" SCREEN NOZZLE LADDER.

EAGLE IRON WORKS
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GENERAL OFFICES: BAY CITY, MICHIGAN
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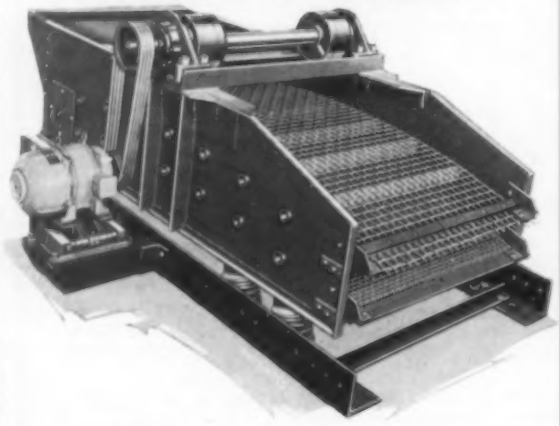
FUEL COSTS *reduced 60%*
MAINTENANCE *reduced 25%*
OUTPUT *increased 40%*

The economy of Industrial Brownhoist Diesel cranes is not confined to a few exceptional cases. Wherever used — on bucket, hook or magnet work — these cranes are saving thousands of dollars each year over former handling methods. The above percentage figures are an example and are taken from the records of a large steel producer.

Surprising though such figures may sound, they are an indication of the savings you can expect from these modern machines. With capacities ranging from 10 to 50 tons, there is an Industrial Brownhoist Diesel crane of the right size to do a real profit-earning job on your work. Would you like to have our sales engineers help you compile comparative data?

DEISTER PLAT-O VIBRATING SCREEN



1. Powerful high-speed vibrating mechanism.
2. Screen cloth automatically held under uniform tension.
3. Any one screening surface changed without disturbing remaining decks.
4. Cushioned vibration.

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SAUERMAN
Long Range
MACHINES

Sauerman Stackline Cableway digs a large, deep pit and lifts material to top of screening plant in a straight-line at a cost of just a few cents per yard.

Upper view shows the simplest scheme for storing and reclaiming surplus output by operating a small Sauerman Power Scraper on a long sloping pile between two masts.

PROBLEMS of moving gravel, sand, crushed rock, distances of 100 to 1000 ft. or more are solved cheaply with Sauerman Scraper or Cableway machines.

There is a double saving when you use a Sauerman machine. You keep down your equipment investment and your daily operating expense is lower than with any other equipment able to dig and haul an equal yardage. One man handles the entire operation. Capacities range from 10 to 1000 cu. yd. per hour.

Sauerman engineers will be glad to study your excavating and stockpiling problems. Their advice may help you to increase your profits. Investigation costs you nothing.

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Superior Diesel

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Nordberg Mfg. Co.

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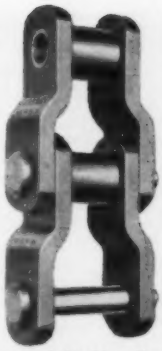
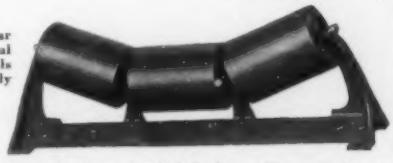
A chain for every elevating and conveying service and for drives; belt idlers for light, intermittent and heavy duty service; buckets and bucket elevators; spiral flights and troughs, steel boots; car pullers; pillow blocks; couplings; clutches; take-ups; pulleys; shafting; gears . . . you can get them all from Jeffrey where quality really proves a real economy. Carried in stock for prompt shipment.

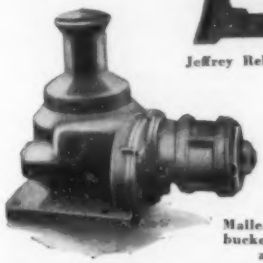


Jeffrey steel thimble roller drive chain

Below — all-purpose car puller with large vertical capstan. Two sizes. Pulls in any direction. Fully enclosed.



Jeffrey Reliance 3-roll belt idler. Also self-aligning idlers.



Malleable or steel buckets of standard styles

The Jeffrey Manufacturing Company

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A quick, easy, time-saving method of keeping in touch with the latest developments in machinery and equipment.

Just check the items you want to know more about and mail the self-addressed reply card.

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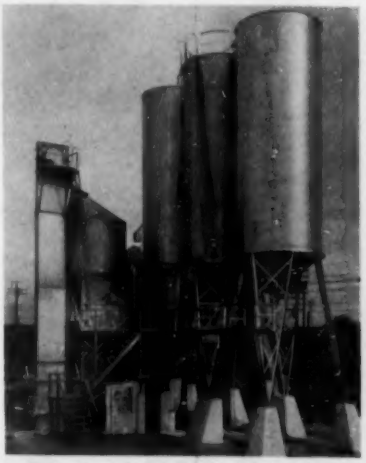

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PLEASE CONSULT TELEPHONE DIRECTORY

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that Drill Chuck!

For 30 or 40 cents worth of Colmonoy No. 6, applied on the worn sections, it can easily be reclaimed. For hard-surfacing all metal parts that are subject to excessive wear and abrasion Colmonoy will save you money. Colmonoy is easily applied, and the diamond-like crystals of patented chromium boride, (Cr Br2) insure maximum wearing qualities. Our engineers will co-operate in selecting the proper grade for each job. *Write for Catalog.*

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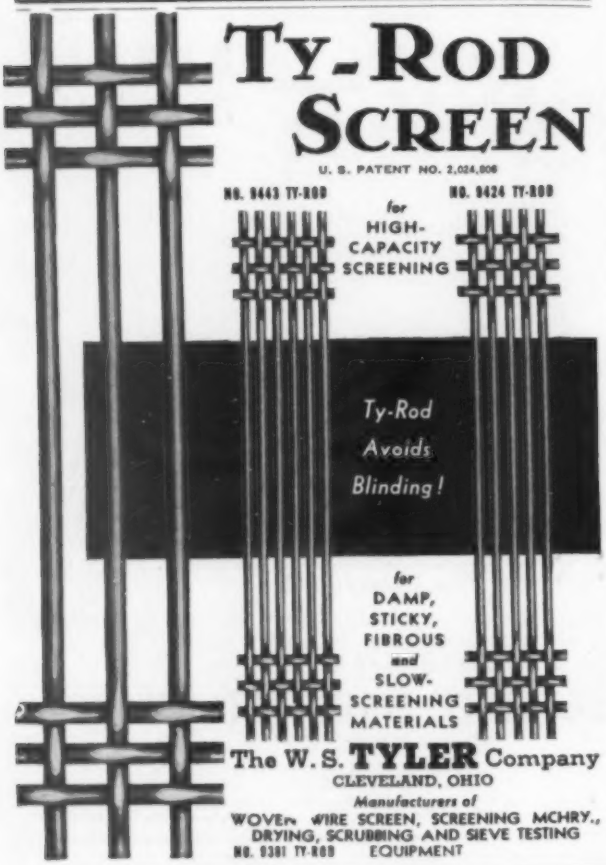
U. S. PATENT NO. 2,024,606

NO. 9443 TY-ROD for HIGH-CAPACITY SCREENING NO. 9424 TY-ROD



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NORBLO Fans are especially adapted for solving dust collecting and air handling problems.

Each fan is subjected to a careful inspection and can be relied upon to give satisfactory service for years under most severe conditions. Expert workmanship and only the best material is used in the manufacture of NORBLO fans.

Write today for complete details on NORBLO Texrope Driven Fan, NORBLO Bag Type Dust Arresters and NORBLO Air Filters.

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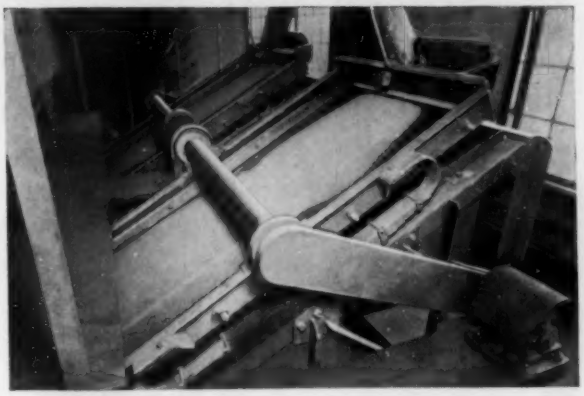
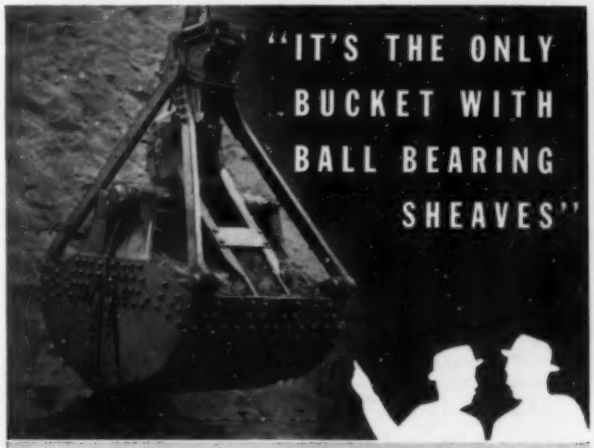
VIBRATING SCREENS by LINK-BELT



Made in several types, for screening sand, gravel, crushed stone, coal, coke, clay, lime, fertilizer, ores, grain, sugar, chemicals, pulpwood chips, etc. Send for Catalog No. 1562. Address Link-Belt Company, Philadelphia, Chicago, Indianapolis, Atlanta, San Francisco, or any of our offices, located in principal cities. 7820

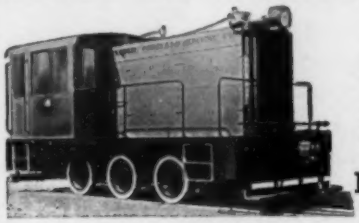


Yes, sealed ball bearing sheaves keep lubrication in and dirt out, to prevent excessive wear and prolong the life of the bucket. In addition Blaw-Knox Buckets make generous use of tough alloy steels to avoid excessive dead weight and provide worthwhile savings in rehandling costs. Write Blaw-Knox today for Bulletin 1606.

16

BLAW-KNOX
BLAW-KNOX DIVISION
• OF BLAW-KNOX CO. •
Farmers Bank Bldg. Pittsburgh, Pa.
Digging and Rehandling BUCKETS

There IS a DIFFERENCE



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Easy, fast handling, utter dependability where continuous operation is an essential, efficiency reflected in lowest cost ton-miles—these distinguish the modern Davenport Locomotives as today's outstanding haulage units for industry.

Available in sizes ranging from 2½ to 100 tons, it is possible to select a Davenport exactly suited to any particular haulage situation.

Give careful consideration to the merits of Davenport Locomotives as cost-reducing, profit-producers. Our engineers will gladly analyze your requirements and submit dependable recommendations without the slightest obligation. DAVENPORT LOCOMOTIVE WORKS, Davenport, Iowa.

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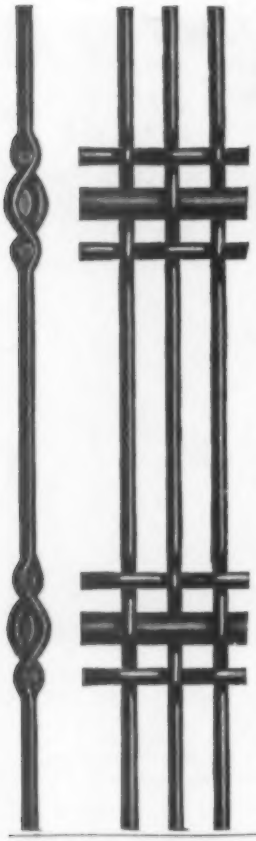

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Long-Mesh
Woven Wire Screens

made to work under tension and vibration.

The straight stay-bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

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WIRE CO. ST. LOUIS

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SCRUBBER

This scrubber will do the good work.

State Capacity Required!

LEWISTOWN FOUNDRY & MACHINE CO.

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Allis-Chalmers Mfg. Co.
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Smidth, F. L., & Co.
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Bradley Pulverizer Co.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Jackson & Church Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Machy. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Mortar Mixers
Chain Belt Co.
Eagle Iron Works
Gruendler Crusher & Pulverizer Co.
Jaeger Machine Co.

Nozzles (Sand Blast)
Sly, W. W., Mfg. Co.

Nozzles (Washing)
Chain Belt Co.
Deister Machine Co.
Link-Belt Co.

Oil Burners
Smidth, F. L., & Co.

Oils (Cutting)
Texas Co., The

Oils (Lubricating)
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co., The

Packers
Smidth, F. L., & Co.

Packing
Goodyear Tire & Rubber Co.

Pallets (Steel & Wood)
Anchor Concrete Machy. Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Commercial Shearing & Stamping Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Pans, Grinding (Wet & Dry)
Eagle Iron Wks.
Jackson & Church Co.
McLanahan & Stone Corp.
Traylor Engr. & Mfg. Co.

Perforated Metal
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Gruendler Crusher & Pulverizer Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Son, Inc.
Traylor Engr. & Mfg. Co.

Pinions
Bacon, Earle C., Inc.
Chain Belt Co.
Frog, Switch & Mfg. Co., The
Jeffrey Mfg. Co., The
Link-Belt Co.

Pipe
Chicago Bridge & Iron Co.
Frog, Switch & Mfg. Co., The

Pipe, Forms & Machine (Concrete)
Besser Mfg. Co.
Stearns Mfg. Co.
Universal Concrete Pipe Co.

Plaster Mixers
Eagle Iron Works
Gruendler Crusher & Pulverizer Co.
Jaeger Machine Co.

Poidometers
Schaffer Poidometer Co.

Pontoons
Chicago Bridge & Iron Co.
Eagle Iron Wks.

Power Transmission Machinery
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co., The
Link-Belt Company
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Power Units
Allis-Chalmers Mfg. Co.
Nordberg Mfg. Co.

Precipitators (Cottrell)
Western Precipitation Co.

Pulleys
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.

Pulverizer Parts
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Dixie Machinery Mfg. Co.
Frog, Switch & Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.

Pulverizers (Hammer, Ring, Rod & Roll) (See also Mills & Crushers)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Blaw-Knox Co.
Bradley Pulverizer Co.
Combustion Engr. Corp.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Sturtevant Mill Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Diaphragm)
Chain Belt Co.
Jaeger Machine Co.

Pump Valves (Dry Pulverized Material)
Fuller Co.

Pumps (Dredge)
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.

Pumps (Dry Pulverized Material)
Babcock & Wilcox Co.
Fuller Co., The
Smidth, F. L., & Co.

Pumps (Slurry)
Allis-Chalmers Mfg. Co.
Dorr Co., Inc.
Smidth, F. L., & Co.
Wilfley, A. R., & Sons, Inc.

Pump Slurry, Valves
Fuller Co., The
Wilfley, A. R., & Sons, Inc.

Pumps (Vacuum)
Allis-Chalmers Mfg. Co.
Fuller Co., The
Smidth, F. L., & Co.

Pumps (Water)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Jaeger Machine Co.

Rectifiers
Allis-Chalmers Mfg. Co.

Recuperators
Traylor Engr. & Mfg. Co.

Refractories
Babcock & Wilcox Co.
Smidth, F. L., & Co.

Regulators (Voltage)
Allis-Chalmers Mfg. Co.

Classified Directory (Cont.)

Rewashers (Screw)
Eagle Iron Works
Link-Belt Co.
Smith Engr. Wks.

Roofing
Ryerson, Jos. T., & Son, Inc.
Texas Co., The

Rope (Transmission)
Allis-Chalmers Mfg. Co.

Sand Drags
Allis-Chalmers Mfg. Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Smith Engr. Wks.

Sand and Gravel Plants
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co., The
Bacon, Earle C., Inc.
Eagle Iron Wks.
Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Sand Lime Brick Machinery
Jackson & Church Co.
Jeffrey Mfg. Co.

Sand Separators
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Simplicity Engineering Co.
Smith Engineering Wks.

Sand Settling Tanks
Chicago Bridge & Iron Co.
Eagle Iron Wks.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Smith Engr. Wks.

Scales (Conveyor)
Chain Belt Co.

Scales (Hopper)
Blaw-Knox Co.

Scrapers (Power Drag)
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co., The
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Sauerman Bros.

Scrapers (Wagon)
Bucyrus-Erie Co.

Screen Cloth & Plates (Perforated)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Gruendler Crusher & Pulverizer Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Crusher Co.

Screen Parts
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Pioneer Engr. Wks.
Screen Equipment Co.
Traylor Engr. & Mfg. Co.

Screens
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Deister Machine Co.
Eagle Iron Works
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Simplicity Engineering Co.
Smith Engr. Wks.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., & Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens (Grizzly)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Eagle Iron Wks.
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Pioneer Engr. Wks. Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Screen Equipment Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

Screens (Laboratory)
Allis-Chalmers Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.
Tyler, W. S., Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Eagle Iron Wks.
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Crusher Co.

Screens (Rotary)
Link-Belt Co.
Smith Engr. Wks.

Screens (Scalping)
Allis-Chalmers Mfg. Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Screen Equipment Co.
Smith Engr. Wks.
Williams Patent Crusher & Pulv. Co.

Screens (Trommel)
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Screens (Vibrating)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machinery Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Deister Machine Co.
Eagle Iron Wks.
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Screen Equipment Co.
Simplicity Engineering Co.
Smith Engr. Wks.
Sturtevant Mill Co.
Tyler, W. S., Co.
Universal Crusher Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

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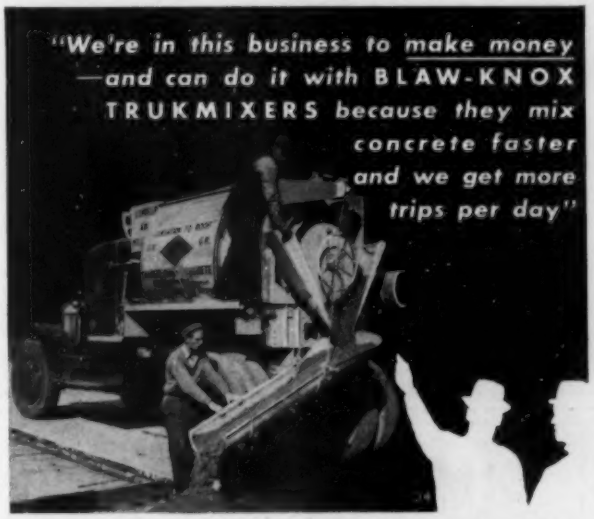
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Screens (Washing)
Link-Belt Co.
McLanahan & Stone Corp.
Screen Equipment Co.

Scrubbers (Washers)
Link-Belt Co.
McLanahan & Stone Corp.
Smith Engr. Wks.
Tyler, W. S., Co.

Seal Rings
Traylor Engr. & Mfg. Co.

Semi-Trailers, Quarry (Side & End Dumping)
Easton Car & Construction Co.

Shafting
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Shale Planers
Eagle Iron Works

Sheaves
Allis-Chalmers Mfg. Co.
Eagle Iron Wks.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Sauerman Bros.

Shovels (Compressed Air)
Nordberg Mfg. Co.

Shovels, Power (Diesel, Diesel-Air, Electric, Gasoline, Gas-Electric, Oil, Steam)
Austin-Western Rd. Machinery Co.
Bucyrus-Erie Co.
General Excavator Co.
Industrial Brownhoist Corp.
Lima Locomotive Works, Inc (Shovel & Crane Div.)
Link-Belt Speeder Corp.
Marion Steam Shovel Co.

Shovels (Tractor)
Austin-Western Rd. Machy. Co.
General Excavator Co.
Lima Locomotive Works, Inc (Shovel & Crane Div.)
Link-Belt Speeder Corp.

Shovels (Truck)
Link-Belt Speeder Corp.

Shovels (Underground)
Allis-Chalmers Mfg. Co.
Lima Loco. Wks., Inc. (Shovel & Crane Div.)
Nordberg Mfg. Co.

Shredders
Williams Patent Crusher & Pulv. Co.

Sieves (Testing)
Hendrick Mfg. Co.
Smidth, F. L., & Co.
Tyler, W. S.

Silos (Storage)
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Smidth, F. L., & Co.

Silo Stave Machines (Concrete)
Besser Mfg. Co.

Skids
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Easton Car & Construction Co.

Slakers (Rotary)
Traylor Engr. & Mfg. Co.

Slugs (Grinding)
Smidth, F. L., & Co.

Slurry Mixers
Dorr Co., Inc.
Smidth, F. L., & Co.

Slurry Separators
Smidth, F. L., & Co.

Slurry Thickeners
Dorr Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Smokestacks
Chicago Bridge & Iron Co.
Hendrick Mfg. Co.
Northern Blower Co.
Traylor Engr. & Mfg. Co.

Speed Reducers (Gear, etc.)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Spouts
Chain Belt Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Sprays & Spraying Equipment
Link-Belt Co.

Sprockets
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.

Stabilization Equipment
Barber-Greene Co.
Besser Mfg. Co.
Gruendler Crusher & Pulverizer Co.
Pioneer Engr. Wks.

Standpipes
Chicago Bridge & Iron Co.
Ross Screen & Feeder Co.

Steel (Abrasive-Resisting)
Ryerson, Jos. T., & Son, Inc.

Steel (Special Alloy)
Chicago Steel Foundry Co.

Stokers
Babcock & Wilcox Co.
Combustion Engr. Co., Inc.
Link-Belt Co.

Storage Equipment
Barber-Greene Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Jeffrey Mfg. Co.
Kern, Fred. T., Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Strippers (Concrete)
Anchor Concrete Machinery Co.
Multiplex Concrete Machinery Co.

Switchboards
Allis-Chalmers Mfg. Co.

Tampers (Power & Hand)
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Kent Machine Co.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Tanks (Air, Storage, etc.)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engr. Co.
Dorr Co., Inc.
Eagle Iron Wks.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Pioneer Engr. Wks.
Raymond Pulv. Div.
Traylor Engr. & Mfg. Co.

Tires & Tubes
Goodyear Tire & Rubber Co.

Towers
Blaw-Knox Co.
Eagle Iron Works
Hendrick Mfg. Co.
Jaeger Machine Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Track and Track Equipment
Besser Mfg. Co.
Chase Foundry & Mfg. Co.
Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Track Systems (Overhead)
Jeffrey Mfg. Co.
Link-Belt Co.

Tractors
Allis-Chalmers Mfg. Co.

Tractors (Electric)
Link-Belt Co.

Trailers (Industrial, Quarry)
Allis-Chalmers Mfg. Co.

Classified Directory (Cont.)

Austin-Western Rd. Machinery Co.
Easton Car & Construction Co.
Ford Motor Co.
Iowa Mfg. Co.
Link-Belt Speeder Corp.

Transformers
Allis-Chalmers Mfg. Co.

Trench Hoes
Link-Belt Speeder Corp.

Trucks (Agitator)
Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.
Smith, T. L., Co.

Truck Bodies (Dump)
Commercial Shearing & Stamping Co.
Dempster Bros.
Easton Car & Construction Co.
Ford Motor Co.
Hendrick Mfg. Co.

Trucks (Diesel)
General Excavator Co.

Trucks (Dump)
Chase Foundry & Mfg. Co.
Ford Motor Co.

Trucks (Electric)
Easton Car & Construction Co.

Trucks (Gas & Gas-Electric)
Easton Car & Construction Co.
General Excavator Co.

Trucks (Hand)
Chase Foundry & Mfg. Co.

Trucks (Industrial)
Chase Foundry & Mfg. Co.
Easton Car & Construction Co.
Iowa Mfg. Co.

Trucks (Mixer)
Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.
Smith, T. L., Co.

Turbines
Allis-Chalmers Mfg. Co.

Turntables (Industrial)
Easton Car & Construction Co.

Unloaders (Boat)
Chain Belt Co.
Link-Belt Co.

Unloaders (Box Car)
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Fuller Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.

Unloaders (Car, Bin, Truck, etc.)
Barber-Greene Co.
Bucyrus-Erie Co.
Chain Belt Co.
Fuller Co.
Gruendler Crusher & Pulverizer Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Robins Conveying Belt Co.
Universal Crusher Co.

Unloaders (Pneumatic)
Fuller Co.

Unloaders (Underground)
Jeffrey Mfg. Co.
Nordberg Mfg. Co.

Ventilating Apparatus
Blaw-Knox Co.
Northern Blower Co.

Vibrators (Bin and Concrete Form)
Besser Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Stearns Mfg. Co.
Tyler, W. S., Co.

Vibrating Screens
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machinery Co., The
Bacon, Earle C., Inc.
Chain Belt Co.
Deister Machine Co.
Eagle Iron Works
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Co.
Nordberg Mfg. Co.
Pioneer Engineering Wks.
Robins Conveying Belt Co.
Screen Equipment Co.
Simplicity Engineering Co.
Smith Engr. Wks.
Sturtevant Mill Co.
Tyler, W. S., Co.
Universal Crusher Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Wagons (Dump)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Easton Car & Construction Co.

Washers (Log)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Washers (Sand, Gravel & Stone)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chicago Bridge & Iron Co.
Dorr Co., Inc.
Gruendler Crusher & Pulverizer Co.
Hendrick Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Lewiston Fdry. & Machy. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Crusher Co.
Universal Vibrating Screen Co.

Weighing Equipment
Blaw-Knox Co.
Chain Belt Co.
Fuller Co.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Schaffer Poidometer Co.

Welding Rods
Bradley Pulverizer Co.
Ryerson, Jos. T., & Son, Inc.

Welding Wire
Hazard Wire Rope Co.

Winches
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Wire Cloth
Bacon, Earle C., Inc.
Cleveland Wire Cloth & Mfg. Co.
Eagle Iron Works
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
Pioneer Eng. Wks., Inc.
Robins Conveying Belt Co.
Screen Equipment Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.

Wire Rope
American Cable Co.
Hazard Wire Rope Co.
Leschen A., & Sons, Rope Co.

Wire Rope Clips
American Cable Co.
Hazard Wire Rope Co.
Leschen A., & Sons

Wire Rope Fittings
American Cable Co.
Hazard Wire Rope Co.
Leschen A. & Sons, Rope Co.

Wire Rope Hooks
American Cable Co.
Hazard Wire Rope Co.
Leschen A., & Sons, Rope Co.

Wire Rope Lubricants
Texas Co., The

Wire Rope Slings
American Cable Co.
Hazard Wire Rope Co.
Leschen, A., & Sons, Rope Co.

Wire Rope Sockets
American Cable Co.
Hazard Wire Rope Co.
Leschen, A., & Sons Rope Co.

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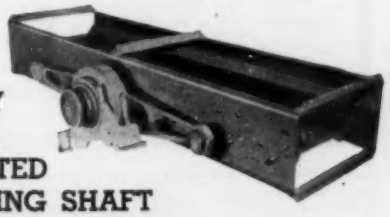

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WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

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centrifugal SAND PUMPS

for Slurries, Sand Tailings, Slimes, Acid Sludges

Save Pumping Costs

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AIR COMPRESSORS

Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

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10—1—118 ton Blaw Knox; 2—85 ton Heltzel; 1—60 yd. Butler V-60; 1—72 ton Blaw Knox; 1—46 yd. Johnson offset; 1—60 ton Butler V-49; 2—35 ton Blaw Knox; 1—26 ton Heltzel with Kron dial scale. All above with or without weigh batchers.

1—Cement plant: 1—300 bbl. Johnson, portable.

BUCKETS

26—Clamshell, all sizes and types; Williams, Blaw Knox, and Owen.

6—Dragline: 1—1¾ yd. Northwest; 1—1½ yd. Omaha; 1—1¼ yd. Page; 2—1 yd. Hayward; 1—⅝ yd. Page; 1—1½ yd. Pioneer Cableway Excavator bucket.

7—Dragscraper: 2—1 yd Sauerman; 1—1 yd. Green; 1—¾ yd. Garst; 2—½ yd. Garst.

CONVEYORS & ELEVATORS

4—18" Steel frame belt conveyors: 3—Barber-Greene, 60', 45' and 24'; 1—National 30'.

11—Bucket elevators: Rex and Weller, on chain or belt; all sizes.

CRANES, DRAGLINES & SHOVELS

1—Link Belt Mod. K-55 combination dragline and shovel Ser. No. 1698, gasoline power, 70' dragline boom, 2 yd. shovel front.

1—Page, Model No. 411 Diesel crawler dragline, 70' boom, 2 yd. bucket.

1—Industrial Brownhoist Mod. DC, Serial No. 5029, 50 ft. boom, 1¼ yard bucket.

1—Link-Belt K-42, combination shovel, crane and trench hoe, Serial No. 1265, 1¼ yd. shovel front, 60' crane boom.

3—Northwest, Model 105, Serial No. 1602-2053 & No. 1522 60' boom, 1 yd. bucket.

1—Link-Belt, K-1, Serial No. 1024, 50' boom, 1 yd. bucket.

2—Osgood Heavy Duty, Serial No. 2069 & No. 2087, combination 1 yd. shovel and crane, 40' boom.

2—Thew, Model "0" combination shovel crane and dragline, Serial No. 2201 & No. 2687, ¾ yd. shovel fronts, 40' crane boom.

1—P & H Model No. 206, 40' boom, ¾ yd. bucket.

1—Byers Hearcat, Serial No. 3299, 30' boom, ½ yd. bucket.

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DREDGE PUMPS

1—12" Morris Heavy Duty D.C. to 180 H.P. dbl. cyl. steam engine.

3—Belt driven Morris: 1—10" Mang., 1—8", 1—6" Mang.

CRUSHERS

5—1—12"x26" Champion; 1—12"x20" Acme; 1—10"x20" Climax No. 2½; 1—9"x16" Telsmith No. 9A; 1—9"x15" Champion.

3—Gyratory: 1 No. 5 Gates; 1 No. 3 McCully; 1 No. 0 McCully.

1—Set of Allis Chalmers, smooth type crushing rolls, 42x16".

TRACTORS AND SCRAPERS

4—18 yd. LeTourneau Type BY scrapers with Caterpillar D8 Diesel tractors, new 1938.

WHIRLEY

1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75' boom, 3D. Clyde 80 HP elec. hoist & 30 HP elec. swinger, all complete. Perfect condition.

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225 bbl. Erie bulk cement plant, complete.
155 bbl. Fuller cement bin, electric batcher.
Blaw Knox 270 bbls. bulk cement plant, complete.
72 ton Blaw Knox steel bin, portable, 2 compts.
50 ton Blaw Knox steel bin, portable, 2 compts.
Pumpcrete machines, Model 180, 190 & 200.
Fuller Kinyon bulk cement unloader, portable.
Fuller C40 rotary air compressor, electric.
Gyratory crushers: K.V.S. 30, 37-S, 49; Telsmith 32, 8A, 8B; Traylor 8"; McCully 13", 8", 6".
Jaw: 6x12, 9x16, 10x20, 12x20, 13x30, 15x30, 16x32, 36x48, 48x66.
Jeffrey Type A 30" x 24" pulverizer.
Robbins apron feeders, 18" x 6', 24" x 6'.
Traylor apron feeder, 5' x 15'.
Bucket elevator, 47', belt, buckets 24"x9"x11".
Bucket elevator, 22' chain, buckets 8"x6"x12".
Revolving screens, 72"x20', 72"x18', 60"x24'.
Robbins, 4x8 double deck Gyrex vib. screen.
Whirley, 25 tons cap., 85' boom, electric.
43-B Bucyrus Erie Diesel 2 yd. shovel.
41-B Bucyrus Erie comb. crane and shovel. Steam.
50-B Bucyrus Erie steam shovel.
Browning 10 ton crane, gas, 40' boom.
Gen. Excavator ½ yd. comb. crane-shovel. Gas.
Universal 7½ ton truck crane, Mack truck.
Lorain 40 truck crane, 8½ tons, 45' bm. Mack truck.
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Haiss clamshell bucket, 1½ yd. rehandling.
Blaw Knox 1 cu. yd. dragline bucket.
Barber Greene conveyor, 24"x70'.
8 Barber Greene conveyors, 24"x35', type N.
Barber Greene conveyor, 18"x60'.
4 I. R. Wagon drills, FM-2, pneumatic tires.
Complete stone washing plant. Write for details.
I. R. Model 50 Leyner drill sharpener.
Gas locomotives, 2½ to 35 tons.
6—Koppel 3 yd. 36" ga. steel V dump cars.
Dredge pumps, 6", 8", 10", 12", 16", 8"x8" cent. Lawrence pump, portable, 35HP., gas.
8"x6" cent. Barnes pump, portable, 25 HP., gas.
6"x5" Lawrence pump, 20 HP., electric.
4"x4" cent. LaBour self priming pump, 15 HP.
Ing. Rand XCB-2 676 cu. ft. air compressor.
Sullivan WJ-3 850 cu. ft. air compressor.
Ing. Rand 315-A Diesel air compressor, portable.
Sullivan WK60 315 cu. ft. portable air compressor.
DeWalt Woodworker, 18" circular saw, electric.
Wodack "D" portable hand saw, circular, electric.
Stiff leg derrick, steel, 30 tons, 97' boom.
Steam hoist, 10"x12", 3 drums, Lidgerwood.
Clyde 3 drum electric hoist and swinger, 75 HP.
Lidgerwood, 2 drums, swinger, gas hoist, 75 HP.
Sauerman 4 yd. dragline hoist, 150 HP. electric.
Sauerman two drum dragline hoist, 75 HP. gas.

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CRUSHERS

GYRATORY: 42" McCully with 80% brand new parts. 36" Allis-C. 20" Super. McCully conv. to 16". Gates Nos. 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 5, 6, 8C, 9 & 16. Also Many Austins, Kennedys and Traylors, many sizes.

JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72, Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 9x30, 15x30.

REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 24" TZ, 8", 10", 12" Super. McCully 6" & 10". Newhouse 5, 7 & 10". Symons Cone & Disc Ty. 2' to 4'.

ROLLS: Allis-C. 12½x12, 36x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16, Etc., Etc.

HAMMERMILLS: Williams No. 1, 2, 3, 4, 5 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.

MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x6 & 10x9. Hardinge 6'x2', 8'x30" & 6'x9'. Misc. Tube Mills 5' & 6' x 22'. Sturtevant Ring Roll. Raymonds, Kents, Fuller-Lehigh, Etc., Etc.

CRUSHING PLANTS: No. 65 Diamond. No. 22 Pioneer 8x24. 1030 Good Roads, 9x40 Austin-Western, 9x36 C.R.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

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Complete for Belt Drive — In Good Condition

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9x18 DIAMOND Roller Bearing Jaw Crusher
10x20 DIAMOND Roller Bearing Jaw Crusher.
10x36 DIAMOND Roller Bearing Jaw Crusher.
15x36 DIAMOND Roller Bearing Jaw Crusher.
2'6"x4'0" Single Deck DIAMOND Vibrating Screen.

NEW EQUIPMENT

1—DIAMOND 9x16 Bronze Bearing Jaw Crusher mounted on truck with 15-20 H.P. engine Special price for quick sale.

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Minneapolis, Minn.

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36" Link-Belt Self-Contained Apron Feeder.
30"x200' Robins Belt Conveyor Equipment.
30"x32' Link-Belt Package Conveyor.
24"x60' Conveyor Equipment. Ball-br'g.
24" R-G & Fairfield Reciprocating Feeders.
20"-18"-16"-14" Belt & Idlers In Stock.
24"x40' Continuous Chain Bucket Elevator.
18" Haiss Loader On Wheels.
14"x30' Link-Belt Encased Bucket Elevator.
14"x30' Jeffrey Open Type Bucket Elevator.
14"x50' Contin. Belt Bucket Inclined Elevator
3—5"x30' Encased Belt Bucket Elevators.

CRUSHING & SCREENING EQUIPMENT

Jaw Crushers: 9x15, 9x16, 10x20, and 12x18.
24"x36" Geared Corrugated Crushing Rolls.
15"x8" Jeffrey Swinghammer Pulverizer.
30" Telsmith Rotary Grizzly, Steel Encased.
3x5 1-d. Multirap Dry Or Wet Vibr. Screen.
3x6 1-d. Flat-O-Vib. Screen, with Motor.
2—3x8 Link-Belt 1-d. Vibrating Screens.
4x5 1-d. Hummer Vibr. Screen, V-40 Head.
120 New Hummer Screen Sections, 3x5 & 4x5.
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MISCELLANEOUS EQUIPMENT

Air Compressors: 660', 360', 173' Belted.
2-stage Worthington Belted Compressor, 11 lb.
2-drum Stroudsburg Builders Hoist, gas.
50 & 60-hp. Waukesha Engines, with Clutch.
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No. 40 Cletrac Caterpillar Tractor, gasoline.
Clamshell Buckets: ¾, 1, 1¼, & 2½-yd. cap.
12 Centrifugal Electric and Belted Pumps.
800-hp. Kelley Feed Water Heater, coils.
20' Overhead Traveling Crane, 6-ton cap.
Rails & Cars: 11 Koppel 24"-g. Cars, 1-yd.

G. A. UNVERZAGT
15 Park Row — New York City

LOCOMOTIVES

2—Vulcan, 55 ton, std. gauge, steam, power reverse, air operated fire doors, Nat. Board boilers 200 lbs. pressure, air brakes, built 1933, used nine months.

1—Vulcan, 40 ton, same as above except track gauge is 36".

Diesel Engine

1—450 HP, 4 cyl. 4 cycle, solid injection, 225 RPM, with or without 300 KW AC generator 2200 volts.

Modern Equipment for Contractors & Quarries

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Castalia, Ohio (2 miles from Sandusky and 50 miles west of Cleveland)

ROTARY KILNS

2—8'x125' Reeves Bros. Rotary Kilns, each equipped with ¾" thick steel shell, triple riveted on ¾" circumferential butt straps, double riveted longitudinal with ¾" straps. Supporting rolls are the cradle or equalizing type with four rolls per tire; 15" face tires; 13" face girth gear. Each kiln is equipped with firing hood on wheels; one spare extra new girth gear and two rolls with shafts. In excellent condition with no bulges or other defects in shell, in the hot zone or elsewhere.

5—6'x120' Rotary Kilns, each with ½" steel plate shell, firing hood on wheels, 8" face tires, 9" girth gear, double riveted, butt strapped, single roller trunnions or two rolls per tire.

5—6'x60' Rotary Kilns; specifications same as 6'x120' kilns.

ROTARY DRYERS

3—6'x60' Direct Heat Rotary Dryers.

1—4'6"x50', Direct Heat Rotary, double shell.

1—4'x60' Rotary Dryer or Cooler, made by Bonnot Co., Canton, Ohio; ½" shell.

MACHINE SHOP

Quick Change Engine Lathes, Key Seater, Shaper, Planer, Threading Machine, Forcing Press, Drills, Emery Grinder, Hack-Saw, Milling Machine, Electric Welder, Wrenches, Reamers, Hoists, etc.

LOCOMOTIVES

4—18 ton Steam Industrial Locomotives, (3—Porter and 1—Vulcan); 36" gauge, 10"x16" cylinders, saddle tank type; each with locomotive tender, having Blakeslee jack pump.

DUMP CARS

391—1½ yd. Atlas type, two-way; 36" gauge, steel bodies.

INDUSTRIAL TRACK

7 Miles of Industrial Track; 2 miles with 60 lb. rail, 5 miles 40 lb. rail, with 37 switches and frogs.

ATTENTION: PLANT OWNERS!

THE EQUIPMENT IS SO DIVERSIFIED AS TO BE APPLICABLE TO EVERY KIND OF CHEMICAL PROCESS OR INDUSTRIAL MANUFACTURING PLANT! Prices are purposely set low to obtain quick action. We urge your immediate inspection. Representative is on premises with full authority to sell.

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7-Ft. Symons Cone CRUSHER

Fitted with fine bowl.

For immediate shipment. At large savings.

BOILER PLANT

2—250 H.P. Heine Horizontal Water-Tube Boilers; 1—5'x100' high x ¼" steel stack; including boiler feed pumps, steam pumps, water purifier, etc.

LABORATORY

Tyler Rotap Testing Screen
Fairbanks Cement Tester
Electric Muffle Furnace
Analytical Balance
Disc Grinder
Miscellaneous Glassware, etc.

PUMPS

15—Centrifugal Pumps; 3", 4", 5", 6" with direct connected motors, except three with gasoline engine drive.

TRAVELING CRANE & RUNWAY

1—10 ton Harnischfeger Traveling Crane and 300 ft. long Runway. Crane is 20,000 lb. capacity, 70' span, equipped with 3—25 H.P. and 1—7½ H.P. G.E. a.c. motors. Included is a 1½ yd. bucket.

LOCOMOTIVE CRANE

1—20 ton Browning No. 8 Locomotive Crane, with 40' boom and 1¼ yd. bucket, No. 8 wheels, 40,800 lb. at 14' r.

MISCELLANEOUS

3—42" Fuller-Lehigh Pulverizers, gear driven, with direct connected 75 H.P., 3/60/440 v. 514 RPM. motors.

1—30" Ohio Electric Magnet, with motor gen. set for operating it.

1—24"x24" Jeffrey Single Roll Crusher.

1—60" Exhaust Fan, with 26"x18" wheel.

2—Car Pullers, each with direct connected 10 H.P. motors, with 150' ⅝" cable.

1—Car Puller, single drum, with 600:40 James Reducer and 10 H.P. motor.

1—Pennsylvania Hammer Mill, SXR-46, made by Pennsylvania Crusher Co., Philadelphia, Pa. Steel frame, tramp iron separator, quick adjusting cage, ball and socket self-aligning bearings, adjustable breaker plate; hopper 2'10" x 1'3" wide; 100-125 H.P., 1000 RPM; floor space 5'9" x 8'4".

2—¾ yd. Erie Type "B" Crawler Steam Shovels.

BALL AND TUBE MILLS

2—5'x22' Allis-Chalmers.

3—5'x22' Bonnot Co., Canton, Ohio.

1—5'x23' Bonnot Co., Canton, Ohio. All silex lined, equipped with CAST STEEL HEADS, steel gears and direct geared to 150 H.P., G.E., slip ring motors, 585 RPM.

6—5'x27' Tube Mills, roller mounted. Silex lined, with 200 H.P. slip ring motors, 585 RPM.

1—8'x48" Hardinge Conical Ball Mill, Titanite lined, with 175 H.P., 600 RPM. slip ring motor.

3—5'x12' Bonnot Ball Mills, cast steel heads, steel lined, with 150 H.P., 600 RPM. motors.

MISCELLANEOUS

1—12' dia. Dry Grinding Pan, Phillips & McLaren, 60"x16" mullers, steel tires.

1—Apron Pan Feeder, 36" wide x 11'6" c/c, with roller chain drive, 600:40 James reducer and 10 H.P. Lincoln motor.

2—6'x5' Tyler Hummer Screens, made up of 3'x5' screens, double deck; Nos. 1102 and 1103; type 31, with screw feeder.

1—Motor Generator Set for operating Tyler Screens.

800 Ft.—12" Screw Conveyor, steel encased, in assorted lengths of 21', 23', 25', 50', 60', 80', 104' and 106'.

44—9"x29' long Screw Conveyors, also one each 9', 22' and 32'.

3—30" Belt Conveyors; 2—34' c/c, flat with rubber belt; 1—70' c/c, flat with canvas belt.

1—36" Stedman 3-cage Disintegrator, Shop No. D-946.

1—Ingersoll-Rand Imperial type 10 Air Compressor; steam, 10" & 16"x14"; air 10x14".

7—Portable Garages, galv. steel, one car.

1—4"x8" Jaw Crusher, Sturtevant Mill Co.

1—50'x100' Steel Building, with corrugated siding and roofing, 22' to eaves.

40—Steel Lockers, Durand, 15"x15"x6'.

1—72" Volume Blower, 42"x24" wheel with direct connected 60 H.P. motor.

17—Slurry Mixing Tanks, 10' dia. x 15', 8800 gal., wood, with agitators.

2—Dust Collectors; 1—3 compartment, by Dust Recovery & Conveying Co., and 1—6 compartment Norblo, made by Northern Blower Co.—each complete with fans, shaking device, steel supports, etc.

8—Bucket Elevators, chain, steel enclosed, malleable buckets. (Full listing in circular.)

ELECTRIC MOTORS

4300 Horsepower in Electric Motors, all 3 Phase, 60 Cycles, 440 Volts. Included are 9—150 H.P. and 6—200 H.P. slip ring; 585 RPM. Shop numbers 5166879, etc.

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AIR COMPRESSORS
BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
ELECTRIC: 478, 675, 867, 1302, 1722 & 2200 Ft.
DIESEL: 603, 807 & 1000 Ft.
PORTABLE GAS: 110,160,220,310,540 & 1300 Ft.
STEAM: 40, 310, 528, 1300, 2200 & 3600 Ft.
CLAMSHELL BUCKETS, SKIPS & GRAPPLES
Owen R A & H Stone Grapples.
2 Yd. OWEN Type S Material Handling.
1⅛ Yd., 1 Yd. & ¾ Yd. HAYWARD Class E.
48 Steel Skips 6½ x 6 x 2½.
5 Ton Bucyrus Rack Grabs.
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12 Ton NORTHWEST 50 Ft. Boom Gas.
20 Ton LIMA, 750 Diesel, 65 Ft. Boom.
25 Ton BROWNING & 20 Ton AMERICAN Loco.
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom.
CATERPILLAR SHOVELS
⅝ Yd. Bucyrus 10B Electric & ¾ yd. Nisley Gas.
2 Yd. Marion Steam Shovel.
⅜ Yd.,1⅛ Yd.,2 Yd. & 4 Yd. MARION Electrics.
1 Yd. NORTHWEST Gas.
1½ Yd. LIMA Diesel.
1½ Yd. BUCYRUS 41B Steamer.
4 Yd. Bucyrus 120B Electric. Also 3 yd. Erie Elec.
DUMP CARS
46—KOPPEL 1½ Yd. 24 & 30 In. Ga.,V Shaped.
15—2 Yd., 3 Yd., 4 Yd., 6 Yd., 12 Yd., 36 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd.Cap.
15—Std. Ga. 50 Ton Battleship Gondolas.
FLAT CARS
9—50 ton std. ga. heavy duty flat cars.
HOISTING ENGINES
Gas: 15, 30, 60, 100 & 120 HP.
Electric: 30, 52, 80, 100 & 150 HP.
Steam: 6¼x8, 7x10, 8¼x10, 10x12, 12x14.
DIESEL UNITS
75, 90, 180, 240 HP F. M. Engines.
110 HP Ingersoll- Rand Engine.
175 KVA Worthington 3/60/2300.
275 KVA Fairbanks 3/60/2300.
BALL, ROD AND TUBE MILLS
6x8 Pebble Mill & 5x5 Batch Mill.
3'x8" & 5'x22" HARDINGE CON. Dry Ball Mill.
3'x36" HARDINGE CONICAL Wet Ball Mill.
5'x22" HARDINGE CONICAL Pebble Mill.
8'x22" HARDINGE CONICAL Ball or Pebble Mill.
4x8, 8x8 & 10x9 Straight Ball Mills.
4x16, 5x18 & 5x22 Tube Mills & 6'x22'.
3½x8 & 5x7 Air Swept Tube Mills.
2x4½, 3x10 & 5x12 ROD MILLS.
PULVERIZERS
JEFFERY 24x20 & 1¼ Sturtevant B.R.
RAYMOND Auto. Pulverizer No. 0000, 0 & 3.
RAYMOND Imp. Mills No. 4, 22 & 55.
GRUENDLER XXB Mill & Jay Bee No. 2 & 4.
RAYMOND 4 & 5 ROLL MILLS & 5 ft.Chaser M.
STEEL STORAGE TANKS
10,000 Gal., 15,000 Gal. & 20,000 Gal. Cap.
MATERIAL BIN
116 Ton Blaw Knox 2 Compt.
400 BARREL CEMENT BIN
400 Barrel Butler Portable Steel Cement Bin with Fuller automatic batcher, push button control.
SEPARATORS AND COLLECTORS
Gayco 5 ft., 12 ft. and 14 ft. Separators.
Type 360 Sly 8x24,8x52 and 16x42 Dust Collectors.
ROLL CRUSHERS
36x60 Fairmount & 36x16 Allis Chalmers.
JAW CRUSHERS
10x8, 12x7½, 14x7, 15x9, 15x10, 16x9,16x12,16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 26x12,30x15,30x13, 36x15, 36x20, 36x18, 36x14, 36x9,36x6,36x10,36x24, 42x9, 48x42, 48x36, 60x42, 84x66, 96x16, 9x36.
CONE & GYRATORY CRUSHERS
42 in. McCully Mammoth Gyratory.
5 No. 19, 25, 27 & 49 Kennedy.
18 in.,24 in.,30 in.,36 in.and 48 in.Symons Disc.
4—10 TZ Traylor 4 ft. Gyratory.
4—Nos. 5, 2 & 6 Austin Gyratory.
5—Traylor T-12 Bulldog Gyratory, also 16 inch.
8 in. Traylor T. Gyratory.
17 Gates K—Nos. 2, 4, 5, 6, 7½, 8 & 9½.
10 Inch Austin Model 105.
10 & 13 Inch Superior McCullys.
SYNCHRONOUS MOTOR GENERATORS
100 K.W. RIDGWAY 3/60/2200-250-275 volt.
150 K.W. GEN. ELEC. 3/60/2200-250-275 v.
200 K.W.RIDGWAY 3/60/2200-250-275v.,900 rpm.
SLIP RING MOTORS
52 H. P. GEN ELEC. 3/60/440 v., 1200 rpm.
(2) 100 H.P.GEN.ELEC.3/60/440v.,900-1200 rpm.
CONVEYOR PARTS
BELT: 1000 Ft.60 In.,700 Ft.40 In.,600 Ft.36 In., 800 Ft.30 In.,1642 Ft.24 In.,517 Ft.20 In., 297 Ft.18 In., 800 Ft.16 In.,300 Ft.14 In.
IDLERS: 84 In.,42 In.,36 In.,30 In.,24 In.,20 In.,18 In.,16 In. & 14 In.
Head & Tail—Pullers—Takeup for all sizes.
Steel Frames: 2,000 Ft.24 In.,30 In.& 36 In. Sections.
ROTARY DRYERS AND KILNS
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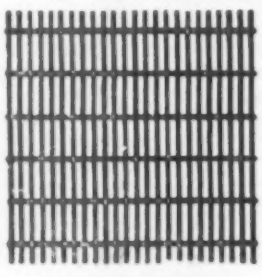

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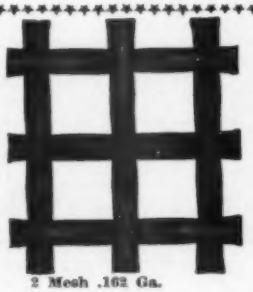

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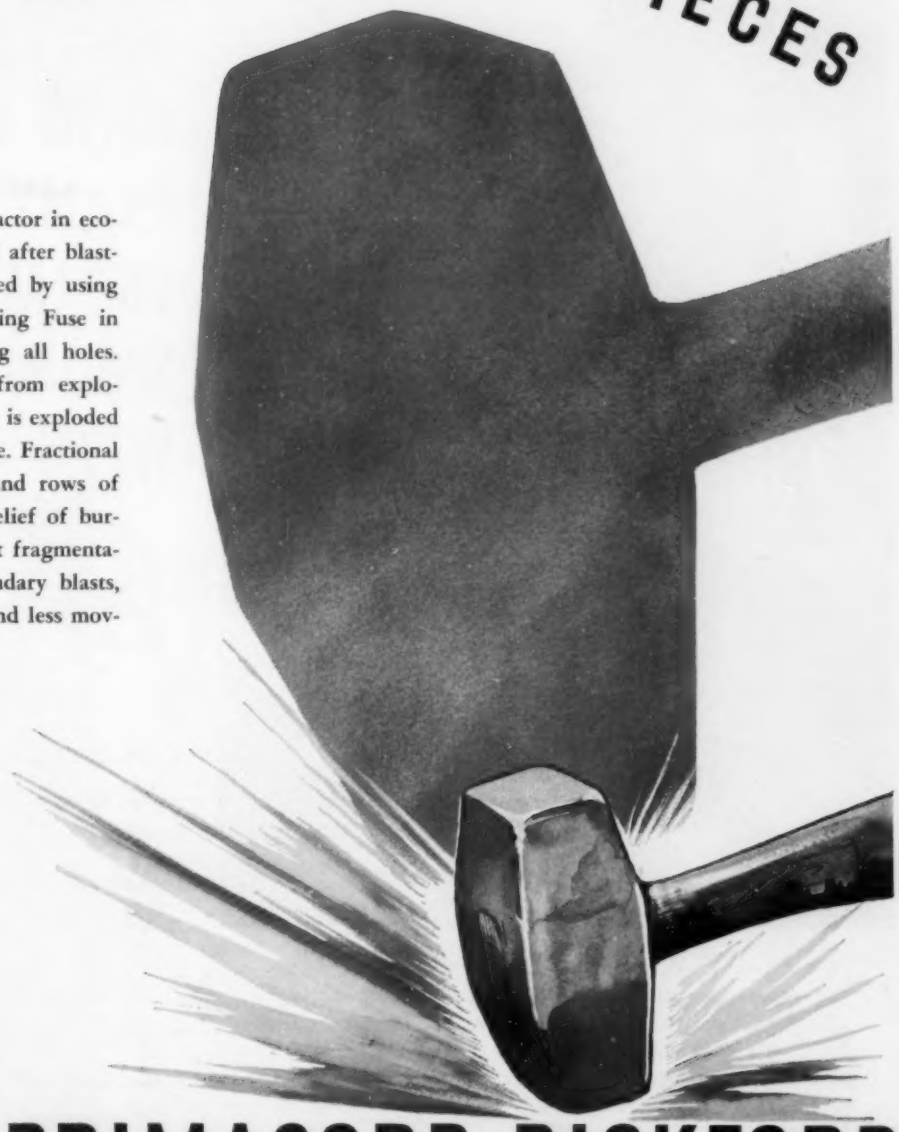

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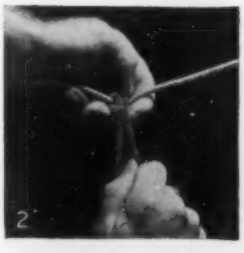
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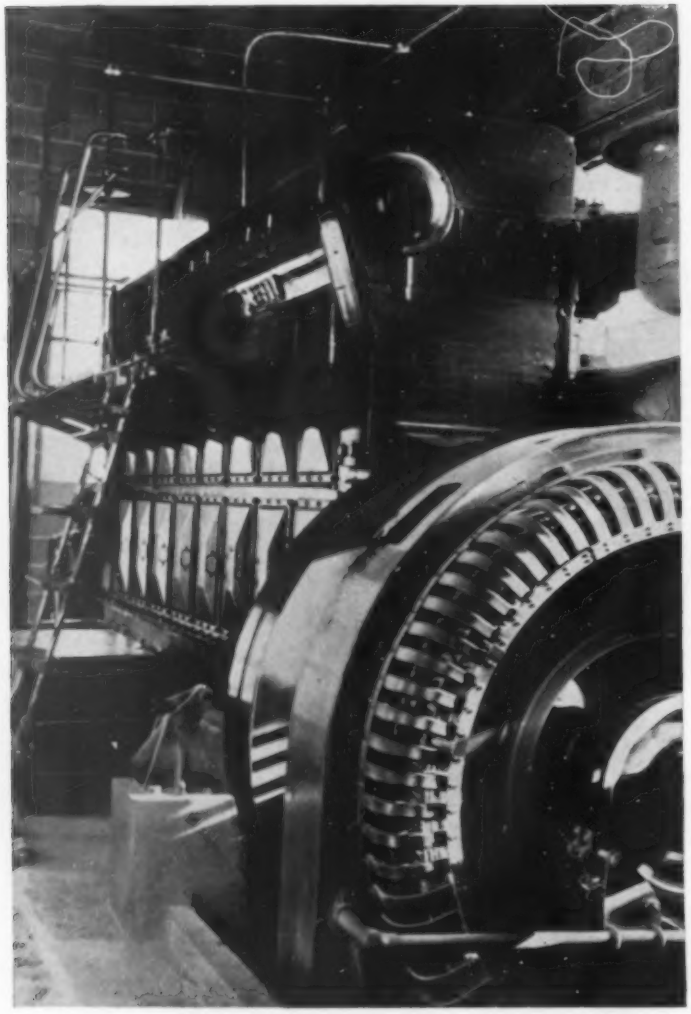

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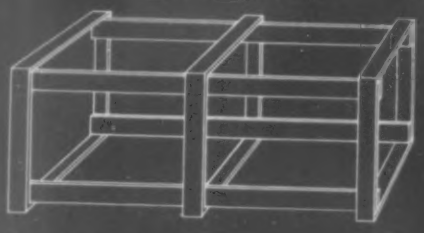

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H25

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